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March 1, 2010

Mr. Raymond Klimcsak
United States Environmental Protection Agency
Region 2
290 Broadway
New York, NY 10007-1866

RE: Evaluation of Soil, Sediment, Surface Water and Groundwater Results,
And Proposal for Additional Site Characterization
Former Manufacturing Plant

Sherwin-Williams/ Hilliard Creek Site
Gibbsboro, New Jersey
Administrative Order Index No. II CERCLA-02-99-2035

Dear Mr. Klimcsak:

As requested, The Sherwin-Williams Company (Sherwin-Williams) is providing four copies of the Evaluation of Soil, Sediment, Surface Water and Groundwater Results, and Proposal for Additional Site Characterization of the Former Manufacturing Plant, Sherwin-Williams / Hilliard Creek Site, located in Gibbsboro, New Jersey.

Should you have any questions or comments, please do not hesitate to contact me at (216) 566-1794 or via e-mail at mlcapichioni@sherwin.com.

Sincerely,

Mary Lou Capichioni

Mary Lou Capichioni
Director, Remediation Services

Encls.

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EVALUATION OF SOIL, SEDIMENT, SURFACE WATER AND GROUNDWATER RESULTS, AND PROPOSAL FOR ADDITIONAL SITE CHARACTERIZATION

FORMER MANUFACTURING PLANT
SHERWIN-WILLIAMS/HILLIARDS CREEK SITE
ADMINISTRATIVE ORDER INDEX NO. II CERCLA-02-99-2035

March 1, 2011

Prepared for:

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EXECUTIVE SUMMARY

Between September 2009 and August 2010, The Sherwin-Williams Company (Sherwin-Williams) conducted an initial site investigation of the Former Manufacturing Plant (FMP) area of the Sherwin-Williams Hilliard Creek Site. The investigation was conducted under the oversight of the United States Environmental Protection Agency (EPA) Region 2 New Jersey Remediation Branch.

The scope of the investigation was presented in a May 2009 Remedial Investigation Work Plan (RIWP), which was approved by the EPA in a Comment Letter dated July 9, 2009. This letter approved the May 2009 RIWP, but requested some clarifications and revisions to the text and tables contained within. A revised text dated July 28, 2009, along with the applicable tables, was submitted to EPA to formalize the submission. The scope of work included:

- Collecting soil samples from a series of soil borings in study areas within and adjacent to the FMP.

- Collecting sediment samples from select locations along transects in Silver Lake and at locations where water flows into Silver Lake.

- Collecting surface water samples from select locations within Silver Lake and locations where storm water flows into Silver Lake.

- Redeveloping and collecting water levels and groundwater samples from FMP-related monitoring wells. No additional groundwater monitoring wells were installed during this phase of investigation.

- Conducting a physical investigation of geophysical anomalies identified during a 2003/2004 investigation of the FMP.

All samples were collected according to procedures specified in the RIWP and approved by the EPA. For soil samples, the collection protocol included field analysis with an X-Ray Fluorescent (XRF) and field screening with a photoionization detector (PID) to support field decisions regarding the depth to which the borings would be installed and the depth intervals from which samples would be collected.

With the exception of soil samples obtained from borings installed for the purpose of supporting the property owner, Brandywine Operating Partnership, L.P. (Brandywine) with a proposed property maintenance project (and not part of the original RIWP scope of work), all soil, sediment, surface water and groundwater samples were analyzed for a wide range of constituents. These included Target Analyte List (TAL) Metals (plus cyanide), Target Compound List (TCL) volatile organic compounds (VOCs), TCL Semi-Volatile Organic Compounds (SVOCs), and TAL polychlorinated biphenyls (PCBs) and pesticides. Soil samples collected above the water table were also analyzed for total

petroleum hydrocarbons, while the soil samples collected below the water table were not analyzed for TAL PCBs and pesticides.

The results of the investigation have been compared to screening criteria that have previously been used at other Sherwin-Williams Hilliard Creek areas. In general, these are the New Jersey Department of Environmental Protection (NJDEP) Residential Direct Contact Soil Remediation Standards (RDCSRS) for soil, the NJDEP Lowest Effects Level (LEL) Ecological Screening Criteria (ESC) for sediment, the NJDEP Class II-A Ground Water Quality Standards (GWQS) for groundwater, and the NJDEP FW2 surface water standards for chronic aquatic protection.

The results of the investigation support several observations:

Soil

Arsenic and lead, which have been found extensively in other portions of the Sherwin-Williams Hilliard Creek Site, are found only intermittently in the FMP at levels greater than the RDCSRS. Arsenic and lead were not found at levels greater than the RDCSRS in any off-property study area, the former Lagoon Area, former Tank Farm A, or the Seep Area.

Residual petroleum contamination is found in portions of the former Resin Plan, Tank Farm A, the former Gas Station, the Eastern Off-Property Area, and the Seep Area. Based on field observations and PID readings, the residual petroleum contamination extends into the saturated zone as far as 20' – 25' below ground surface in some locations. The residual petroleum contamination does not contain a large number, or high concentrations, of target analytes. Naphthalene is the constituent most frequently found in the residual petroleum contamination at concentrations greater than the RDCSRS, while benzene is found less frequently (primarily near former Tank Farm A) and at lower levels in comparison to the RDCSRS. Ethylbenzene and xylenes are also found in some samples, but at levels less than the RDCSRS.

PCBs, primarily Aroclor 1260, were found in soil along the proposed Silver Lake conveyance bypass in the Main Plant area at concentrations of up to 23 milligrams per kilogram (mg/kg). PCBs were not found at significantly elevated levels outside of this specific area.

Pentachlorophenol was found at levels greater than the RDCSRS in several samples obtained from the former Lagoon Area. Pentachlorophenol was not found at levels greater than the RDCSRS in any other area, although, because of its presence in groundwater in the former Tank Farm B area, additional investigation of soil the saturated zone will be conducted.

Low to moderate levels of several polynuclear aromatic hydrocarbons (PAHs) are found in a number of study areas. The PAHs were found almost exclusively in shallow soil (frequently the 0.0' – 0.5' interval), supporting a conclusion that they may be fill related. In many instances, the concentrations of the PAHs are less than the Residential Direct

Contact Soil Cleanup Criteria (RDCSCC) that were used by the NJDEP as cleanup criteria until 2008.

Sediment

Approximately one-half the sediment samples obtained from the Silver Lake transects contained no constituents at levels greater than the ESC or contained only one or two constituents at relatively low levels in comparison to the ESC.

The highest frequency of detection of constituents at levels greater than the ESC and the highest concentrations of constituents in comparison to the ESC are found in the southern portion of Silver Lake, south of Silver Lake transect SL-7.

The presence of constituents at levels above the ESC is strongly related to the organic carbon content of the sediment sample. Samples obtained primarily or exclusively from the underlying coarser-grained sediments (which are characterized by very low organic carbon levels), either contained no constituents at levels greater than the ESC, or contained low levels of a single constituent. The soft, organic-rich sediment did contain metals, PAHs and other constituents at levels above screening criteria.

Cyanide was the constituent most frequently found at a level greater than the ESC. Copper and lead were the metals most frequently found at levels greater than the ESC.

Samples collected from the northern portion of Silver Lake and from storm water influent locations throughout the lake as well as the southern portion of the lake, contained elevated levels of constituents greater than the screening criteria.

Surface Water

Surface water samples from Silver Lake contained few constituents at levels above screening criteria.

Barium was the only metal found at a concentration greater than its screening criterion in any filtered surface water sample obtained from Silver Lake, and was also found above the screening criterion in the unfiltered sample collected at the same location. No other metals except aluminum were found at a level greater than its screening criterion in two unfiltered samples obtained from Silver Lake.

PAHs were found at levels greater than the ESC in seven of the eight samples obtained from Silver Lake. Because these samples were not filtered, and the sample was obtained from a depth of approximately six inches above the bottom of the lake, it is possible that the presence of the PAHs is due to the entrainment of small particles in the water samples.

Aluminum was found in filtered and/or unfiltered samples from all locations where storm water enters Silver Lake, and PAHs were found in one location.

Groundwater

Both shallow and deeper groundwater flows in a northeast to southwest direction. Both Hilliard Creek and Bridgewood Lake appear to act as localized discharge areas for shallow groundwater.

Benzene is found at concentrations greater than the GWQS in shallow groundwater across an area that includes the former Resin Plant, Tank Farm A, Main Plant and Seep areas.

Benzene is also found in the deeper groundwater and extends from approximately the former Tank Farm A area to just north of Bridgewood Lake. The concentrations of benzene in the deeper groundwater are up to 10 times the concentrations found in shallow groundwater.

Selected metals, pesticides, PAHs, and VOCs were also found in one or more shallow wells at levels greater than the GWQS. In general, the majority of these constituents were found at levels only slightly greater than their respective GWQS, and the data support an initial conclusion that some metals, including aluminum, iron and manganese may be naturally-occurring. The presence of arsenic in shallow groundwater at a level greater than the GWQS appears related to the localized geochemical conditions caused by the residual petroleum contamination and not an anthropogenic sources of arsenic.

Geophysical Anomaly Investigation

For the majority of the targets investigated during the course of the geophysical anomaly investigation, there were no remarkable or unusual observations or the presence of structures that warrant further investigation.

There are three targets that warrant further action and discussion with EPA regarding the applicability of Interim Remedial Measures (IRM).

Proposal for Additional Actions

Sherwin-Williams is proposing to conduct additional soil sampling to complete the horizontal and vertical delineation of constituents in several study areas, and to conduct additional surface water sampling in Silver Lake to assess whether PAHs found in surface water at levels greater than the ESC are associated with particle entrainment. No additional sediment sampling is proposed, and, as discussed with the EPA Regional Project Manager, Sherwin-Williams is continuing to evaluate the groundwater data and will provide to the EPA a proposal for additional groundwater investigation by June 1, 2011.

The scope of work for the supplemental investigation of soil consists of installing 39 additional soil borings across several of the on-property FMP study areas and in the Eastern Off-Property Study Area. As with the soil sampling reported on in this data

evaluation report, the soil borings will be field screened with a PID and analyzed with an XRF, and additional step-out borings may be installed based on the results of these field analyses. The primary objectives of the supplemental soil boring investigation are to

- complete the delineation of the residual petroleum contamination found in several study areas,
- better define soil conditions in the Main Plant Area (and particularly the proposed Silver Lake Conveyance Bypass), and
- complete delineation of pentachlorophenol in the former Lagoon Area.

Six additional surface water samples will also be collected. Paired sets of filtered and unfiltered samples will be collected from three locations in Silver Lake where PAHs were found at concentrations greater than the ESC.

A technical memorandum proposing the implementation of IRMs for the geophysical targets meriting additional action (targets T-11, T-31, and T-54) will be prepared upon EPA's concurrence of the necessity for such measures. The IRMs will most likely consist of removal and/or abandonment in place of the underground storage tank (UST) (T-31) and tank-like structure (T-54) and modification to the existing product recovery system via the installation of a well point or sump (T-11).

SECTION 1.0
INTRODUCTION

In May 2009, The Sherwin-Williams Company (Sherwin-Williams) provided to the United States Environmental Protection Agency (EPA) the "*Supplemental Remedial Investigation Work Plan*" (RIWP) for the Former Manufacturing Plant (FMP) area of the Sherwin-Williams/Hilliards Creek Site. The scope of the investigation described in this RIWP incorporated a series of comments from both the EPA and the New Jersey Department of Environmental Protection (NJDEP) and was approved by the EPA in a Comment Letter dated July 9, 2009. This letter approved the May 2009 RIWP, but requested some clarifications and revisions to the text and tables contained within. A revised text dated July 28, 2009 along with the applicable tables was submitted to EPA to formalize the submission.

In subsequent correspondence (EPA's October 26, 2010 comment letter on the April 30, 2009 Kirkwood Lake Investigation Report), the EPA requested that an analysis of the data collected pursuant to the July 2009 RIWP for the FMP, along with a proposal for additional characterization, be submitted to the EPA within 60 days. On December 13, 2010, Sherwin-Williams provided to EPA a request to extend the date of submission to March 1, 2011. EPA approved this request on December 14, 2010. This data evaluation report and proposal for additional site investigation activities is provided in response to the EPA's request.

Section 2 of this document summarizes the approved scope of work conducted at the FMP and adjacent properties. Included are brief descriptions of the FMP and the adjacent properties at which the investigation was conducted, as well as a discussion of the investigation activities that were performed. This section is intended to provide an overview of the investigation scope of work, and is not a restatement of all of the details provided in the July 2009 RIWP. Section 3 provides the results of the investigation, including an analysis of the constituents that were found above screening criteria and the vertical and horizontal extent to which these constituents were found. To the extent possible at this time, preliminary conclusions regarding the nature and extent of the constituents found in soil, sediment, surface water and groundwater are provided. This document is not intended to be a final Remedial Investigation Report, however, so the initial conclusions provided here should be considered preliminary. Section 4 is the proposal for additional soil and surface water characterization, including the locations at which additional characterization is proposed and along with the analytical parameters that would be included. Section 5 provides a discussion of the investigation of the geophysical targets, and Section 6 briefly summarizes the investigation findings and proposal for additional investigation.

Sherwin-Williams continues to evaluate the groundwater sampling results obtained during this phase of investigation and will, in a subsequent document, provide to the EPA a proposal to install additional groundwater monitoring wells and/or conduct additional sampling. Section 3.c, "Groundwater Sampling Results", provides to the EPA the results of the most recent rounds of groundwater sampling and a discussion of those results.

SECTION 2.0
FORMER MANUFACTURING PLANT SCOPE OF WORK

Presented in this section are a brief description of the FMP and adjacent properties at which investigation activities were conducted and a summary of the sampling activities and laboratory analyses performed.

2.1 SITE DESCRIPTION

The FMP is located in Gibbsboro, Camden County, New Jersey (Figure 1). The FMP is bounded to the north by Silver Lake and the property boundary, to the east by United States (U.S.) Avenue, to the west by Clementon-Gibbsboro Road, and to the south by vacant land, Cedar Grove Cemetery and Bridgewood Lake (Figure 2).

The FMP property is currently the Paint Works Corporate Center, an office, warehouse and light manufacturing complex, owned by the Brandywine Operating Partnership, L.P. (Brandywine). A number of tenants occupy the complex.

The FMP and adjacent properties were divided into a series of study areas based on location and operational history (Figure 3). These study areas, developed in consultation with the EPA, were:

2.1.1 ON-PROPERTY STUDY AREAS

- Silver Lake. Silver Lake is located north of the FMP and extends to Route 561/Lakeview Drive.

- Former Resin Plant and Material Storage Area. This area is located in the northern portion of the FMP, on the eastern side of Silver Lake and west of U.S. Avenue.

- Former Tank Farm A. The former Tank Farm A area is located in the northeastern portion of the FMP, along U.S. Avenue, and north of the 2 Foster Avenue building.

- Former Main Plant Area. The former Main Plant Area is generally the area north of Foster Avenue and south of Silver Lake, west of the 2 Foster Avenue building and east of Clementon-Gibbsboro Road.

- Former Tank Farm B. The former Tank Farm B area is located south of Foster Avenue and west of Hilliard Creek.

- Seep Area. The Seep Area is the area south of Foster Avenue, west of U.S. Avenue and east of Hilliard Creek.

- Former Pump House. The former Pump House is located southwest of the Seep Area, at the eastern bank of Hilliard Creek.

- Former Lagoon Area. The former Lagoon Area is located immediately south of the Seep Area and north of the Northern Bridgewood Lake Tract.

2.1.2 Off-Property Study Areas

- Northern Bridgewood Lake Tract. This area is located south of the former Lagoon Area, north of Bridgewood Lake, and east of Cedar Grove Cemetery.

- Former Gas Station. The former gas station is located on the southeast corner of U.S. Avenue and Berlin Road.

- Southern Off-Property Area. This area is located south and west of the former Lagoon Area on the east side of Hilliard Creek.

- Eastern Off-Property Area. This area encompasses the eastern side of U.S. Avenue, extending from an area across U.S. Avenue from Former Tank Farm A south to a location across U.S. Avenue from the Seep Area.

- Northern Off-Property Area. This area is located north of the former manufacturing plant property line on the east side of Silver Lake.

- Western Off-Property Area. This area is located along the western perimeter of the former manufacturing plant boundary, adjacent to Clementon-Gibbsboro Road.

The investigation of the FMP and adjacent properties included soil, sediment, surface water and groundwater sampling and analysis. The scope of work approved by the EPA is summarized in the following section.

2.2 DESCRIPTION OF SOIL, SEDIMENT, SURFACE AND GROUNDWATER INVESTIGATION

The July 2009 RIWP provided a detailed discussion of the sampling locations, sample collection protocol, analytical parameters and criteria against which the analytical results for the samples collected would be compared. A summary of these components of the July 2009 RIWP is presented in this section to assist in the review of the results presented in Section 3.

2.2.1 Sample Collection Locations

The sample collection locations included in the July 2009 RIWP were selected based on knowledge of historic operations conducted at the FMP, the results of previous investigations at and adjacent to the FMP (summarized in the July 2009 RIWP), and

direction from the EPA. The scope of work specified in the July 2009 RIWP consisted of:

- Collecting soil samples from 82 soil borings, consisting of:

  - One location along the eastern bank of Silver Lake;
  - Six borings in the former Resin Plant and Material Storage Area;
  - Eight locations in the former Tank Farm A area;
  - Ten locations in the former Main Plant Area, including four deep (approximately 70 feet) borings in the vicinity of the historic production wells;
  - Four locations in the former Tank Farm B area;
  - Six locations in the Seep Area;
  - Three locations in the former Pump House area;
  - Twelve locations in the former Lagoon Area;
  - Six locations in the former Main Plant and Resin Plant areas to investigate potential areas of concern (transformers, weed killer tank and cesspool);
  - Six locations in the Northern Bridgewood Lake Tract;
  - Four locations in the former Gas Station;
  - Three locations in the Southern Off-Property Area;
  - Six locations in the Eastern Off-Property Area;
  - Four locations in the Northern Off-Property Area; and
  - Three locations in the Western Off-Property Area.

  A total of 96 borings were eventually installed as part of the soil investigation. A total of 14 additional borings were installed in the Main Plant Area in support of Brandywine's proposed Silver Lake Conveyance Bypass Project. This project was designed to excavate and replace a portion of the underground system (historic culvert portion) that conveys water from Silver Lake to Hilliard Creek. In support of Brandywine, Sherwin-Williams installed the additional borings along the proposed bypass route. In some borings, samples were collected for laboratory analysis, but in others only x-ray fluorescence (XRF) analyses and photoionization detector (PID) screening were conducted.

- Collecting sediment samples from 25 locations along eight transects in Silver Lake and at eight locations where water flows into Silver Lake.

- Collecting surface water samples from eight locations along Silver Lake transects and eight locations where water flows into Silver Lake.

- Redeveloping and collecting water levels and groundwater samples from 36 of the 38 monitoring wells proposed in the July 2009 RIWP. No additional groundwater monitoring wells were installed during this phase of investigation.

Soil, sediment and surface water sampling locations are presented on Figure 4. Groundwater monitoring well locations are presented on Figure 5.

2.2.2 Sample Collection Protocol

Samples were collected pursuant to pre-determined protocols specified in the July 2009 RIWP to ensure that representative samples were collected for laboratory analysis and to support field decisions to collect additional samples based on field observations.

2.2.2.1 Soil Samples

With the exception of the soil boring collected on the bank of Silver Lake and the deep borings installed in the vicinity of the locations of the former production wells, the sample collection protocol was the same for all soil borings:

- A direct push (GeoProbe) rig was used to install all borings and collect samples.

- Continuous 4-foot cores were collected, and all cores were screened at 2-foot intervals with a PID and XRF unit. Based on the results of the field screening, the field team had the responsibility of determining the depth to which each boring would be extended.

- Each soil boring was advanced at least 2 feet into the saturated zone (deeper when evidence of contamination was found by the PID, XRF or visual observation). Soil borings in the Former Lagoon Area extended at least 2 feet into native soil, and, where contamination was suspected based on field observations, 2 feet below the depth at which no field screening or visual evidence of contamination was found.

- Samples were collected at three regular, pre-defined intervals:

  - 0-2 feet: Samples were collected from the 0-0.5-foot and 1.5-2.0-foot intervals of native soil (beneath asphalt or concrete).
  - The 0.5-foot interval immediately above water table.
  - The 0.5-foot interval immediately beneath the final interval at which field screening and observations indicated no contamination.

  Samples were also collected from other intervals when one of three conditions was encountered:

  - If there was visual evidence of contamination (staining, free product, pigment) not found in one of the regularly-collected sample intervals.
  - If a PID reading was observed at an order of magnitude (or more) greater than that found in one of the regularly-collected sampling intervals.
  - If an XRF result for lead and/or arsenic was found at an order of magnitude (or more) greater than that found in one of the regularly-collected sampling intervals and was above the established screening criteria for lead or arsenic.

The soil sampling protocol utilized is summarized on Figure 6. This figure was originally provided as Figure 5-2 in the "*Supplemental Remedial Investigation Work Plan – Sherwin-Williams / Hilliard Creek Site – Former Manufacturing Plant Gibbsboro, NJ*", dated May 2009 (revised July 2009).

The sampling protocol for the four deep borings was similar, except that no field screening or soil sampling was conducted until a change in geology was observed from the sands at the bottom of the Kirkwood-Cohansey aquifer (the shallow groundwater formation) to the clayey silt at the top of the Composite Confining Layer (the semi-confining layer separating the shallow and deep groundwater formations). At this depth (approximately 40 – 43 feet; see logs for MPSB0072 through MPSB0075; Appendix A), a 4-foot core of the clayey silt was obtained. The cores were field screened with the PID. If elevated PID readings had been observed, additional cores would have been collected. However, no elevated PID readings were observed, so the samples from 0.0' – 0.5' and 1.0' – 1.5' intervals were collected from each boring. The sample from the 0.5' – 1.0' interval in the Composite Confining Layer was also collected at location MPSB0074.

Samples were collected from three pre-defined depth interval in the bank sample location of Silver Lake (SLSB0001). The samples were collected from the 0.0' – 0.5', 1.5' – 2.0' and 2.5' – 3.0' intervals.

2.2.2.2 Sediment Samples

Prior to collecting sediment samples at any location, the thickness of the soft, organic-rich sediment was measured. The number of samples of soft, organic-rich sediment that was collected at each sample location was dependent upon the thickness of the sediment in that location. It was found that, in the majority of locations, the soft, organic-rich sediment layer was less than one foot thick, so only a 0.0' – 0.5' sediment sample was collected. The soft, organic-rich sediment layer was thicker than 2 feet in only one location, SLDD0002, and a sample from the 2.0' – 2.5' interval was also collected in that location.

2.2.2.3 Surface Water Samples

Surface water samples were collected from the bottom of the water column, 0.5 feet above the surface water/sediment interface, at each of the surface water sampling locations proposed along the Silver Lake transects. Where surface water flows into Silver Lake, samples were collected from 0.5 feet above the surface water/sediment interface or in cases where the water was too shallow, at the mid-point of the water column.

Both unfiltered and filtered samples were collected. The filtered samples were collected using a dedicated in-line 0.45 micron pore-diameter cartridge filter.

2.2.2.4 Groundwater Samples

All monitoring wells were redeveloped (except for WP-13 and MW-42) prior to sampling. WP-13 is a shallow well point that does not recharge sufficiently and MW-42 has not been able to be located and is presumed lost (possibly buried under a debris pile on the Cedar Grove Cemetery property). WP-13 is located on a residential property across U.S. Avenue from Former Tank Farm A and MW-42 is located in the Northern Bridgewood Lake Tract. The monitoring wells were gauged for depth to water and the presence of free product before and after redevelopment, and immediately prior to sampling. Where free product was encountered, it was removed, and a representative groundwater sample was obtained.

Two rounds of sampling were conducted. The majority of the wells were initially sampled in November 2009, but a few were initially sampled in December 2009. All wells were sampled a second time in August 2010. The wells were sampled using a low flow purging and sampling method. Purging was conducted at a rate of 200 to 500 milliliters per minute (mL/min).

During purging, measurements of temperature, pH, dissolved oxygen, oxidation-reduction potential, specific conductance, and turbidity were obtained. When these parameters stabilized for three consecutive 5-minute intervals, the sample was collected. The well sampling logs may be found in Appendix B.

2.2.3 Analytical Parameters

All samples, regardless of media, were analyzed for a wide range of analytical parameters. A Sample Summary Table with the analytical methods presented in matrix format is provided Table 1.

The analytical parameters for the soil samples collected from all locations except the four deep borings were:

- 0’ – 2’ feet: the sample collected from the 0’ - 0.5’ foot interval was analyzed for Target Compound List (TCL) Semivolatile Organic Compounds (SVOCs), Target Analyte List (TAL) Metals (plus cyanide), TCL Polychlorinated Biphenyls (PCBs) and Pesticides, total petroleum hydrocarbons (TPH), and total organic carbon (TOC). The sample collected from the 1.5’ – 2’ foot interval was analyzed for TCL Volatile Organic Compounds (VOCs), and TOC.

- All other samples from the unsaturated zone (samples collected above the water table) were analyzed for TCL VOCs, TCL SVOCs, TAL Metals (plus cyanide), TCL PCBs and Pesticides, TPH, and TOC.

- All samples from the saturated zone (samples collected below the water table) were analyzed for TCL VOCs, TCL SVOCs, TAL Metals (plus cyanide), and TOC.

- The samples collected from the four deep borings were analyzed for TOC and TCL VOCs.

- Sediment samples were analyzed for TCL VOCs, TCL SVOCs, TAL Metals (plus cyanide), TCL PCBs and Pesticides, TOC, percent solids and grain size.

- Surface water samples were analyzed for TCL VOCs, TCL SVOCs, TAL Metals (plus cyanide), TCL PCBs and Pesticides, TOC, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), hardness (as $CaCO_3$) and pH. As discussed previously, both filtered and unfiltered samples were collected. The filtered samples were analyzed only for TAL Metals (plus cyanide).

- Groundwater samples were analyzed for TCL VOCs, TCL SVOCs, TAL Metals (plus cyanide), and TCL PCBs and Pesticides. The groundwater samples were also analyzed for natural attenuation parameters including alkalinity, ammonia, free carbon dioxide (CO_2), chloride, methane, ethane, ethene, ferric iron, ferrous iron, nitrate-nitrogen, total phosphorous, sulfate, sulfide, TDS and TOC, in addition to the field parameters discussed previously.

2.3 SCREENING CRITERIA

For purposes of determining whether the horizontal and vertical extent of constituents in the various media have been delineated, and to determine the constituents to be included as analytical parameters in subsequent investigations, the analytical results of the investigation of the FMP have been compared to media-specific screening levels. These screening levels originate from a variety of sources, including EPA and NJDEP guidance and regulations, and have been used at other Sherwin-Williams Hilliard Creek locations.

The screening criteria for soil are the NJDEP Residential Direct Contact Soil Remediation Standard (RDCSRS; NJAC 7:26D et seq., November 2009). These criteria were used for comparison of soil samples obtained from all locations. These screening levels are summarized in Table 2.

The groundwater analytical data were compared to the NJDEP Class II-A Ground Water Quality Standards (N.J.A.C. 7:9C, Appendix, Table A) found at http://www.state.nj.us/dep/wms//bwqsa/docs/njac79C.pdf. The groundwater screening criteria are provided in Table 3.

Surface water results were compared to the NJDEP chronic surface water criteria for fresh water (FW2) aquatic protection (NJAC 7:9B-1.14d, source documentation available at http://www.state.nj.us/dep/wms/bwqsa/docs/0608_SWQS.pdf), or, in the absence of published NJDEP surface water standards, ESC published by the NJDEP or EPA surface water criteria. The surface water screening criteria are presented in Table 4.

Analytical results for sediment samples were compared to the NJDEP Lowest Effects Level (LEL) for freshwater sediment as published in April 2009 (Source: http://www.state.nj.us/dep/srp/guidance/ecoscreening/esc_table.xls). These criteria are presented in Table 5.

SECTION 3.0
INVESTIGATION RESULTS

Presented in the following sections are discussions of the results of the soil, sediment, surface water, groundwater, and geotechnical target investigations. The results of the investigation are presented by media, and the results of the soil investigation are further evaluated by study area. The results for Silver Lake soil, sediment and surface water are presented in a separate section.

The data collected for each medium are presented in both tables and figures, and are referenced in each section. The July 2009 RIWP proposed to retain constituents for analysis in subsequent investigations if a constituent was found at concentrations exceeding the screening criteria in more than one percent of the samples collected in a medium. As discussed in more detail below, Sherwin-Williams has deviated from this criterion as the results of the investigation of each study area provided an adequate and apparent basis from which to select the analytical parameters that are now proposed to be used for the supplemental investigation, as will be described on a case-by-case basis.

3.1 SOIL SAMPLING RESULTS

All soil sampling results are presented in attached Table 6. Due to the extensive analytical parameters and the number of samples collected, these tables are very large. Therefore, Table 7, which summarize the soil samples in which one or more constituents were found at levels greater than the NJDEP RDCSRS, have been created to assist in the review of the data.

The results of the soil investigation are also presented in several figures:

- Figure 7 shows the results of all samples in which one or more constituent was found at a concentration greater than the RDCSRS.
- Figure 8 presents all arsenic and lead laboratory results.
- Figure 9 presents all benzene, toluene, ethylbenzene and xylenes (BTEX) and naphthalene results.
- Figure 10 presents all TPH results.
- Figure 11 is a key map dividing the FMP investigation area into three subareas for the purpose of presenting PID and XRF results.
- Figures 12 - 14 present the PID screening results for all borings installed during the FMP investigation. The figures are broken into 3 sub-areas as presented on Figure 11.

- Figures 15 - 17 present the XRF screening results along with the laboratory analytical results from all borings installed during the FMP investigation. The figures are broken into 3 sub-areas as presented on Figure 11.

- Figure 18 presents the benzo(a)pyrene results for all borings installed during the investigation of the FMP.

- Figure 19 presents the pentachlorophenol results for borings installed in the former Lagoon Area.

- Figure 20 presents the PCB results for the borings installed in the Main Plant area.

Additionally, figures presenting the results of the soil samples collected within each individual On-Property and Off-Property Study Area (Former Tank Farm A, Southern Off-Property Area, etc.) in which one or more constituents were found at levels greater than the RDCSRS have been prepared for ease of review. These figures are discussed within the individual study areas presented in the following sections.

Soil boring logs are provided in Appendix A.

The individual subsections of this report provide detailed discussions of the results of the soil sampling in each study area. There are additionally several general observations supported by the results:

- Arsenic and lead are the only metals found at levels greater than the RDCSRS in any of the FMP investigation areas. The arsenic and lead were found almost exclusively along the Silver Lake conveyance to Hilliard Creek, at former Tank Farm B and adjacent to Hilliard Creek. Arsenic and lead were not found at levels greater than the RDCSRS in any off-property study area, the former Lagoon Area, former Tank Farm A, or the Seep Area.

- Residual petroleum contamination is found in an area encompassing portions of the former Resin Plan, Tank Farm A, the former Gas Station, the Eastern Off-Property Area, and the Seep Area. The residual petroleum contamination is typically characterized by the presence of elevated TPH levels (typically greater than 5,000 milligrams per kilogram [mg/kg]) and PID readings that exceed 500 units. In some locations one or both of these general characteristics were not observed, but other data, including elevated naphthalene levels in soil, support a conclusion that the residual petroleum contamination is present. Based on field observations and PID readings, the residual petroleum contamination extends into the saturated zone as far as 20’ – 25’ below ground surface in some locations.

  The residual petroleum contamination does not contain a large number, or high concentrations, of target analytes. Naphthalene is the constituent most

frequently found in the residual petroleum contamination at concentrations greater than the RDCSRS, while benzene is found less frequently (primarily near former Tank Farm A) and at lower levels in comparison to the RDCSRS. Ethylbenzene and xylenes are also found in some samples, but at levels less than the RDCSRS.

- Soil along the proposed Silver Lake Conveyance Bypass route was found to contain PCBs, primarily Aroclor 1260, at concentrations of up to 23 mg/kg. The highest concentrations of PCBs were found in the upper two feet of soil. PCBs were not found at significantly elevated levels outside of this specific area.

- Pentachlorophenol was found at levels greater than the RDCSRS in several samples obtained from the former Lagoon Area. The highest concentrations were found in the boring located at the eastern edge of the former sludge disposal lagoon. Pentachlorophenol was not found at levels greater than the RDCSRS in any other area, although, as discussed later, its presence in groundwater in the former Tank Farm B area suggests that additional investigation in the saturated zone is needed.

- Low to moderate levels of several polynuclear aromatic hydrocarbons (PAHs) are found in the former Lagoon Area, Seep Area, former Gas Station, former Tank Farm B, former Resin Plant, and the former Main Plant. The PAHs are, with the exception of the former Lagoon Area, found in shallow soil (frequently the 0.0' – 0.5' interval), supporting a conclusion that they may be fill related. In many instances, the concentrations of the PAHs are less than the Residential Direct Contact Soil Cleanup Criteria (RDCSCC), which were used by the NJDEP as cleanup criteria until 2008, such that, when originally placed, the fill would have achieved the NJDEP criteria for residential properties.

A discussion of each individual study area is presented below.

3.1.1 Former Resin Plant and Material Storage Area

Eight borings were installed in the former Resin Plant Area including one boring to investigate the former location of a cesspool and another to investigate a former transformer. As shown on Figure 7 and Figure 21, one or more constituents were found at concentrations greater than the RDCSRS in samples obtained from three locations:

1. MPSB0004 contained arsenic, lead and benzo(a)pyrene at concentrations greater than the RDCSRS in the 3.5' – 4.0' interval.

2. MPSB0010 contained benzene at 6.1 mg/kg at the 10' – 10.5' interval, presumably associated with the residual petroleum contamination found in several contiguous areas of the FMP.
3. MPSB0025 contained PAHs in the 0.0' 0.5' interval and lead at the 3.5' – 4.0' interval.

All of the constituents were vertically delineated:

- Figure 16 shows that arsenic and lead were delineated in MPSB0004 with XRF data at the 9.5' – 10.0' interval, and Figure 8 shows that it was delineated at the 14' – 14.5' interval with laboratory data.

- Figure 9 shows that the benzene in MPSB0010 was delineated at the 13.5' – 14.0' interval.

- Figure 18 shows vertical delineation of benzo(a)pyrene at 14.0' – 14.5' feet in MPSB0004.

- The PAHs in MPSB0025 were vertically delineated in the 3.5' – 4.0' interval (Figure 18), and the lead was vertically delineated in the 5.5' – 6.0' interval (Figure 8).

The arsenic and lead at the 3.5' – 4.0' interval in MPSB0004 are horizontally delineated with XRF results in a number of locations surrounding MPSB0004, including MPSB0001 through MPSB0003, MPSB0005, MPSB0009, MPSB0010, and MPSB0017 (Figure 16). Samples were not collected for laboratory analysis from the 3.5' – 4.0' interval in these surrounding borings because there was no evidence, based on the XRF results, of elevated levels of metals.

No direct evidence of horizontal delineation of the benzo(a)pyrene found in the 3.5' – 4.0' interval at MPSB0004 was obtained, as there were no elevated PID or XRF readings in any surrounding location at the 3.5' – 4.0' interval (Figure 16). However, given the low level of benzo(a)pyrene (0.4 mg/kg), and the presumption that it is fill-related, the absence of elevated XRF levels in the borings surrounding MPSB0004 supports a conclusion that the benzo(a)pyrene is also not present in these surrounding borings.

The benzene found in MPSB0010 was delineated in all directions at locations MPSB0009, MPSB0011, MPSB0004, MPSB0012, and MPSB0001 (Figure 9). It is noted that, because the sampling in the saturated zone was biased towards intervals where elevated PID readings were observed, the 10' – 10.5' interval was not sampled in each of the locations surrounding MPSB0010. However, the samples were obtained from the surrounding locations at the intervals exhibiting the highest PID readings. Since these intervals with elevated PID readings did not contain elevated levels of benzene, it can be predicted that the 10' – 10.5' interval, in which a lower PID reading was observed, also would not have contained benzene at levels greater than the screening criterion.

Based on the results in MPSB0025, additional sampling for lead is needed to horizontally delineate the lead along the shore of Silver Lake to the north and south of MPSB0025.

3.1.2 Former Tank Farm A

Eight borings were initially planned for the former Tank Farm A Area. The final scope of work included nine borings. These included six borings in and around the former tank farm location and three borings south of the 2 Foster Avenue building. Of these, seven borings contained one or more constituents at levels greater than the RDCSRS (see Figure 7 and Figure 22):

- Several PAHs were found in the 0.0' – 0.5' interval of MPSB0016 and MPSB0086.
- MPSB0012 contained naphthalene at concentrations greater than the RDCSRS in the 7.0' – 7.5' and 8.0' – 8.5' intervals.
- Naphthalene was found at the 14.0' – 14.4' interval in MPSB0013.
- Naphthalene was found in 9.0' – 9.5' and 10.0 – 10.5' intervals in MPSB0017.
- Naphthalene and benzene were found throughout the 10.5' to 12.5' interval in MPSB0014.
- Naphthalene was found in the 7.5' – 8.0' interval in MPSB0084.
- PAHs were found in the 0.0' – 0.5' interval, benzo(a)pyrene was found in the 8.0' – 8.5' interval and naphthalene and benzene were found in the 8.0' – 8.5' and 9.5' – 10.0' intervals in MPSB0085.

All constituents were vertically delineated:

- The PAHs found in MPSB0016 were vertically delineated in the 10.5' – 11.0' interval (see Figure 18). Presuming that the PAHs are fill related the absence of elevated XRF results in the 1.5' – 2.0' interval (see Figure 16) would support a conclusion that the PAHs are delineated in the shallower interval.
- The PAHs in MPSB0086 were vertically delineated at the 4.5' - 5.0' interval (see Figure 18).
- Figure 9 shows vertical delineation of naphthalene at 11.0' - 11.5' in MPSB0012.
- The naphthalene in MPSB0013 was vertically delineated at the 27.0' – 27.5' interval (See Figure 9). Based on PID results (see Figure 13), it is likely that the naphthalene is delineated at a shallower interval, possibly 20.5' – 21.0' (PID reading of approximately 100 units).
- The naphthalene in MPSB0017 was vertically delineated at the 14.0' – 14.5' interval (Figure 9).

- The naphthalene and benzene in MPSB0014 were vertically delineated at the 19.5' – 20.0' interval (Figure 9). PID readings obtained at depths greater than 14.5' were generally low (Figure 13), supporting a conclusion that the benzene and naphthalene are likely delineated at an interval shallower than 20.5' – 21.0'.

- The naphthalene in MPSB0084 was vertically delineated in the 14.5' – 15.0' interval (Figure 9).

- The PAHs in MPSB0085 were vertically delineated at the 9.5' – 10' interval (Figure 18).

- The naphthalene and benzene in MPSB0085 were vertically delineated in the 14.5' - 15.0' interval (Figure 9).

The PAHs in MPSB0016 were horizontally delineated in MPSB0014, MPSB0015 and MPSB0017 (Figure 7). No borings were installed beneath the floor of the adjacent building, so delineation immediately to the south of MPSB0016 could not be achieved. However, they were delineated to the south, along Foster Avenue, at location MPSB0084.

The PAHs in MPSB0086 were horizontally delineated to the west at MPSB0032 (Figure 7 and Figure 18). PAHs were found to the south in soil borings MPSB0041 and MPSB0051, installed in the Seep Area. Delineation of the PAHs in these borings is achieved at MPSB0048, also in the Seep Area.

The naphthalene and/or benzene found in the other borings are presumably associated with the residual petroleum contamination found in several study areas. As discussed for the former Resin Plant Area, the area of residual petroleum contamination has been delineated to the north and northwest. This delineation to the north is further confirmed by the results at MPSB0001 and MPSB0002 (Figure 7), in which no constituents were found at levels greater than the RDCSRS, and only minor PID readings were observed (Figure 13).

Delineation of the area of residual petroleum contamination to the northeast is accomplished with Eastern Off-Property Area borings MPSB0079 and MPSB0080, installed in U.S. Avenue (Figure 7). Neither boring contained any constituent at a concentration greater than the RDCSRS and no elevated PID readings were observed (Figure 13). However, both MPSB0079 and MPSB0080 were installed north of the area where the highest PID readings and TPH concentrations were found, and there is no boring immediately east of MPSB0013. Additionally, although only moderate PID readings were observed in MPSB0081, installed in U.S. Avenue east of MPSB0015, it contained naphthalene (Figure 9) at a concentration greater than the RDCSRS and TPH at a concentration of 16,000 mg/kg (Figure 10).

Because no borings were installed beneath the floor of the 2 Foster Avenue or 3 U.S. Avenue buildings, delineation of the residual petroleum contamination to the west and south is not accomplished in the immediate vicinity of former Tank Farm A. However, Main Plant borings MPSB0030 and MPSB0031 provide delineation to the west of the building. No constituents were found in these borings at levels above the RDCSRS (Figure 7 and Figure 22), and TPH levels were low to moderate (Figure 10). MPSB0086, located at the southwest corner of the 2 Foster Avenue building and added to the scope of the investigation of former Tank Farm A, contained only moderate TPH levels (Figure 10), and no constituents considered to be associated with the petroleum contamination, providing a western bound on the extent of the residual petroleum contamination.

Residual petroleum contamination is present both south of the former Tank Farm A Area, in the Seep Area, and east of former Tank Farm A, in the former Gas Station Area and a portion of the Eastern Off-Property Area, and is discussed within each of those study areas.

3.1.3 Former Main Plant Area

Ten borings, including the four deep borings, were initially proposed for the Main Plant Area in the July 2009 RIWP. Upon completion of the characterization activities, samples were collected for laboratory analysis from a total of 17 borings across the former Main Plant Area. These were:

- Four deep borings (MPSB0072 through MPSB0075) to investigate the locations of the former production wells.
- One boring installed to investigate the former location of the weed killer tank.
- Two borings to investigate former transformer locations.
- Four borings in the parking area west of the 2 Foster Avenue building.
- Six borings, not included in the July 2009 RIWP, installed along the path of Brandywine's proposed Silver Lake Conveyance Bypass Project.
- Nine other borings were also installed for the purpose of field screening soil along the Brandywine proposed Silver Lake Conveyance Bypass Project (proposed bypass). For these borings (MPSB0087 through MPSB0095), soil samples were field screened with the XRF and PID, but no samples were collected for laboratory analysis. The sample locations may be found on Figure 4 and the PID and XRF results on Figures 12 and 15, respectively.

A summary of the results of the investigation of the former Main Plant Area follows.

As shown on Figure 9, no BTEX was found in any sample obtained from the deep borings. As shown on Figure 12, no elevated PID readings were observed in any of the deep borings, either.

Neither MPSB0030 nor MPSB0031, located immediately west of the 2 Foster Avenue building contained any constituent at a concentration greater than the RDCSRS (Figure 7 and Figure 23), although it is noted that the laboratory results for lead were rejected (Figure 8). All XRF results for lead in these two borings were well below the RDCSRS, as shown on Figure 15.

Elevated PID readings were observed in MPSB0031 throughout the 0.5' – 4.5' interval (Figure 12). The elevated PID readings are likely associated with the presence of TPH (Figure 10), which was found at a concentration of 3,400 mg/kg in the 0.0' – 0.5' interval.

Arsenic and/or lead was found at concentrations greater than their respective RDCSRS in several of the samples collected to characterize soil along the proposed bypass (Figure 7, Figure 15, and Figure 23). The concentrations of each ranged from slightly greater than the RDCSRS to slightly more than three times the RDCSRS. Depths ranged from the 0.0' – 0.5' to 8.5' – 9.0'.

Arsenic was also found in MPSB0032 and MPSB0033 (Figure 7, Figure 15 and Figure 23), located to the east of the proposed bypass. Concentrations were similar to those found in the samples collected along the proposed bypass route.

PCBs were found at levels greater than the RDCSRS in the samples collected along the proposed bypass route (Figure 7 and Figure 23). Aroclor 1260 was found most frequently. Concentrations ranged from levels slightly greater than the RDCSRS of 0.2 mg/kg up to 23 mg/kg. The highest concentrations were found in the 1.5' – 2.0' intervals in MPSB0019 and MPSB0020, the two northernmost borings from which samples were collected for laboratory analysis. PCBs were also found in samples obtained from MPSB0076, located in the northwest portion of the former Main Plant Area, and in MPSB0019, located to the east of the proposed bypass. In both locations, the PCB concentrations were less than 1 mg/kg.

Several PAHs, and particularly benzo(a)pyrene, were found in samples collected from the former Main Plant Area (Figure 7 and Figure 23). These included samples collected along the proposed bypass, location MPSB0076 near the former production wells, and MPSB0028, in the northwest portion of the former Main Plant Area. The concentrations of the PAHs were generally low in comparison to the RDCSRS. Individual PAHs exceeded 1 mg/kg only in the sample obtained from the 1.5' – 2.0' interval in MPSB0019.

Dieldrin was found in the samples obtained from the 1.5' – 2.0' interval in MPSB0019 and in the 4.5' – 5.0' interval in MPSB0033 at a level greater than its RDCSRS (Figure 7

and Figure 23). It was also reported as an estimated non-detect (JN) in two other samples.

Aldrin was found at the 3.5' – 4.0' and 4.5' – 5.0' intervals at concentrations slightly greater than the RDCSRS.

The arsenic and lead found in both the samples collected for laboratory analysis and those analyzed only with the XRF as part of the proposed bypass were, with three exceptions, vertically delineated (Figure 8 and Figure 15). The exceptions were:

- Neither laboratory nor XRF values were vertically delineated in MPSB0033. The boring was terminated at a depth of five feet in spite of three attempts to advance the boring past refusal. Both arsenic and lead were present at concentrations greater than the RDCSRS in the 4.5' – 5.0' interval.

- The XRF result for lead at the 8.5' – 9.0' interval in MPSB0090 was 461 mg/kg. MPSB0090 was terminated at nine feet due to refusal.

- The XRF result for lead in the 9.5' – 10.0 interval in MPSB0093 was 492 mg/kg. MPSB0093 was terminated at 10 feet, the bottom depth of the proposed conveyance bypass project excavation.

Horizontal delineation of the arsenic and lead can be considered complete to the east, west and south, although at relatively long distances from the locations where arsenic and lead are known to be present in the former Main Plant Area. As shown on Figure 8, horizontal delineation of the lead and arsenic is achieved:

- To the west at former Main Plant area boring MPSB0076 and Western Off-Property boring MPSB0034;

- To the northwest at former Main Plant Area boring MPSB0035;

- To the east at former Main Plant Area borings MPSB0030 and MPSB0031; and

- To the south, along Foster Avenue, in former Main Plant Area boring MPSB0048, former tank Farm A boring MPSB0086 and Seep Area boring MPSB0051.

However, additional data are needed to better define the extent of the arsenic and lead found in soil in and adjacent to the proposed bypass. As discussed in Section 4 of this document, additional sampling is proposed in this area.

The PCBs found in the samples along the proposed Silver Lake conveyance bypass are vertically delineated in all locations except MPSB0024 (Figure 20). MPSB0024 was screened to a depth of 10 feet, and the bottom sample was collected at 6 feet based on an absence of PID and XRF evidence that the boring should be advanced deeper. The

PCB concentration in the 5.5' – 6.0' interval was 0.5 mg/kg (RDCSRS of 0.2 mg/kg). Vertical delineation was achieved in other borings:

- MPSB0019: vertical delineation was achieved in the 8.5' – 9.0' interval
- MPSB0020: vertical delineation was achieved in the 5.5' – 6.0' interval
- MPSB0021 and MPSB0022: vertical delineation was achieved in the 1.5' – 2.0' interval
- MPSB0023: vertical delineation was achieved in the 10.0' – 10.5' interval

Similar to the arsenic and lead, horizontal delineation can also be considered completed, but at relatively long distances from the proposed bypass. As discussed in Section 3 of this document, additional investigation of the Main Plant Area, including the proposed bypass route, is proposed.

The PAHs are vertically delineated in all locations, except MPSB0033 (Figure 18). As discussed previously, MPSB0033 was terminated at a depth of 5 feet, and the benzo(a)pyrene concentration in the 4.5' – 5.0' interval was 0.22 mg/kg, as compared to the RDCSRS of 0.2 mg/kg. In other locations, delineation was achieved at depths no greater than 5.5' – 6.0'.

The PAHs are also horizontally delineated to the west by the samples from the Western Off-Property Area, and the east by locations MPSB0030 and MPSB0031. PAHs were found south of Foster Avenue in samples obtained from the former tank Farm B and Seep Areas. It is not known whether the PAHs are found continuously between the Main Plant and Tank Farm B areas.

The dieldrin found in MPSB0019 is vertically delineated, and is horizontally delineated to the south, east and west (Figure 7 and Figure 23). However, MPSB0033 is the only location from which samples were collected to the north of MPSB0019, so horizontal delineation is not achieved in this direction. Additionally, vertical delineation was not achieved in MPSB0033 for arsenic, aldrin, dieldrin or benzo(a)pyrene because the boring was terminated at five feet.

3.1.4 Former Tank Farm B

Four borings were installed in the former Tank Farm B Area. Three of the borings contained arsenic, lead and benzo(a)pyrene at concentrations greater than the RDCSRS, and one location also contained PCBs at a concentration greater than the RDCSRS (Figure 7 and Figure 24).

Arsenic, lead and benzo(a)pyrene were found in MPSB0038, MPSB0039 and MPSB0040 at levels greater than the RDCSRS. MPSB0038 also contained PCBs (aroclor 1254) at a concentration greater than the RDCSRS.

The arsenic and lead in MPSB0038 were vertically delineated at the 3.5 – 4.0' interval (Figure 8). In adjacent MPSB0039, vertical delineation of the lead was achieved at the

5.5’ – 6.0’ interval, but the arsenic level was 21.6 mg/kg, and vertical delineation for arsenic was not achieved (Figure 8).

Arsenic and lead were not found at levels greater than the RDCSRS in either the 0.0’ – 0.5 (laboratory and XRF – Figures 8 and 17) or 1.5’ – 2.0’ (XRF only – Figure 17) intervals in MPSB0040. However, XRF results found both constituents at concentrations greater than the RDCSRS at the 3.5’ – 4.0’ and 5.5’ – 6.0’ intervals (Figure 17) and laboratory results found both constituents at levels greater than the RDCSRS in the 5.5’ – 6.0’ interval (Figure 8). Vertical delineation was achieved at the 7.5’ – 8.0’ interval (Figure 8).

Horizontal delineation of the arsenic and lead in the former Tank Farm B Area is not complete to the west and northwest of MPSB0038.

Further delineation of arsenic and lead is not needed to the south and east of former Tank Farm B:

- Sampling to the south of former Tank Farm B has previously been conducted as part of the investigation of Hilliard Creek; and

- The Seep Area lies to the east and the sampling conducted found no arsenic or lead at a concentration greater than the RDCSRS.

Additional characterization of deeper saturated soil in the former Tank Farm B area is also required to assess whether pentachlorophenol is present at levels above the RDCSRS. As discussed in Section 3.c.ii, “Shallow Groundwater Sampling Results”, pentachlorophenol was detected at levels above the Class II-A GWQS in monitoring wells MW-16 and MW-17, which are located in former Tank Farm B. The soil borings in the former Tank Farm B area were terminated at a maximum depth of 5.5’ – 6.0’ based on the PID and XRF results, and may not have encountered the pentachlorophenol, if present. Further, as reflected in Table 6, the method detection limit for some samples in former Tank Farm B was greater than the RDCSRS.

3.1.5 Seep Area

Six borings were installed in the Seep Area during this investigation of the FMP. In four of the six borings (MPSB0018, MPSB0026, MPSB0041 and MPSB0047), there was evidence of residual petroleum contamination. Samples obtained from the boring located closest to Hilliard Creek contained arsenic and lead, consistent with the results of the previous investigation of Hilliard Creek. Four of the six locations also contained PAHs at relatively low levels in comparison to their respective RDCSRS.

Samples obtained from borings MPSB0018, MPSB0041 and MPSB0047 contained naphthalene at levels greater than the RDCSRS (Figure 7 and Figure 25). MPSB0047 also contained benzene at a level above the RDCSRS. As discussed for the former

Resin Plant Area and the former Tank Farm A Area, naphthalene and benzene are associated with the residual petroleum contamination.

Samples obtained from borings MPSB0018, MPSB0026, MPSB0041 and MPSB0047 contained TPH at levels greater than 5,000 mg/kg (Figure 10 and Figure 25).

Neither MPSB0048 nor MPSB0051, located in the northern portion of the Seep Area exhibited any evidence of residual petroleum contamination (Figure 7 and Figure 25). Neither benzene nor naphthalene, which are associated with the petroleum contamination, were detected at levels greater than the RDCSRS (Figure 9), TPH levels were low (Figure 10), and PID readings were not significantly elevated (Figure 14).

The naphthalene was vertically delineated in all locations (Figure 9):

- Vertical delineation was achieved in the 14.0' – 14.5' interval at MPSB0018
- Vertical delineation was achieved at the 3.0' – 3.5' interval in location MPSB0041
- Vertical delineation was achieved at the 4.5' – 5.0' interval at location MPSB0047

Although vertical delineation of the naphthalene is achieved, additional delineation is needed to define the horizontal extent of the naphthalene and the residual petroleum contamination it is associated with. As discussed in Section 4 of this document, additional delineation of the petroleum contamination and associated target compounds will be conducted:

- South and west of MPSB0018. Eastern Off-Property location MPSB0082 provides delineation to the east, but neither the southern nor western extent of the residual petroleum contamination has been established.

- East of MPSB0047. Eastern Off-Property locations MPSB0077 and MPSB0078 both contain elevated levels of naphthalene, and additional information is needed to determine if the residual petroleum contamination extends east of MPSB0047 and south of the two Eastern Off-Property locations.

The arsenic and lead found at location MPSB0041 are vertically delineated at a depth of 5.5' – 6.0' with XRF data (Figure 17) and 9.5' – 10.0' with laboratory data (Figure 8). No additional delineation for arsenic or lead is needed, as it can be predicted, based on previous investigations of Hilliard Creek, that arsenic and/or lead is present along the stream bank, and horizontal delineation to the east has been achieved at MPSB0051.

The PAHs are vertically delineated (Figure 18):

- MPSB0041: vertical delineation is achieved at the 9.5' – 10.0' interval
- MPSB0026: vertical delineation is achieved at the 4.5' – 5.0' interval
- MPSB0018: vertical delineation is achieved at the 6.0' – 6.5' interval
- MPSB0051: vertical delineation is achieved at the 4.5' - 5.0' interval

Horizontal delineation of the PAHs is not achieved to the east of MPSB0026, and it is not known whether the area to the west of MPSB0018 contains PAHs.

3.1.6 Former Pump House

Three borings were installed in the former Pump House area. Two of the three borings contained no constituents at concentrations greater than the RDCSRS. Location MPSB0044 contained PAHs in the 0.0' – 0.5' and 1.5' - 2.0' intervals (Figure 7 and Figure 26). The PAHs were all vertically delineated at the 3.0' – 3.5' interval (Figure 18).

The PAHs in MPSB0044 are horizontally delineated to the south at locations MPSB0045 and MPSB0046. Hilliard Creek is located to the west, and the 1 Foster Avenue Building is located to the east. MPSB0041, located along the stream bank, north of MPSB0044, also contains PAHs. It is assumed for purposes of delineation for nature and extent that PAHs are also present between MPSB0041 and MPSB0044. No further horizontal delineation specifically for PAHs is proposed in this area.

3.1.7 Former Lagoon Area

Soil borings were installed in 12 locations in the former lagoon area. Of these, four locations in the northwest portion of the study area contained pentachlorophenol and three in the eastern portion contained PAHs (Figure 7 and Figure 27). Two of the locations in which pentachlorophenol was found also contained PAHs.

The highest concentrations of pentachlorophenol was found in boring MPSB0049, where the concentration was 490 mg/kg in the 2.0' – 2.5' interval and 410 mg/kg in the 5.5' – 6.0' interval. Substantially lower concentrations were found in the other locations.

The pentachlorophenol was vertically delineated at the following depths in two locations (Figure 19):

- MPSB0049: vertical delineation was achieved in the 14.0' – 14.5' interval
- MPSB0056: vertical delineation was achieved in the 4.5' – 5.0' interval and the boring was completed to 10 feet

Vertical delineation was not achieved in two locations:

- MPSB0067: pentachlorophenol was found at 3.9 mg/kg (RDCSRS of 3 mg/kg) in the 13.5' – 14.0' interval, and the boring was terminated at 14 feet; and

- MPSB0068: pentachlorophenol was found at 5.8 mg/kg in the 12.0' – 12.5' interval and the boring was terminated at 12.5 feet.

The pentachlorophenol is not horizontally delineated:

- Additional delineation is needed around MPSB0049 to bound the elevated pentachlorophenol levels observed in the 2.5' – 6.0' intervals.

- Further delineation to the west of MPSB0056 is needed to delineate the pentachlorophenol found in the 0.0' – 0.5' interval.

- Additional horizontal delineation is needed around MPSB0067 and MPSB0068 to define the extent of the pentachlorophenol found at depths of 12 – 14 feet.

The PAHs were found at levels greater than the RDCSRS in the 0.0' – 0.5' interval at locations MPSB0049, MPSB0058 and MPSB0068. Vertical delineation was achieved in each of these three locations (Figure 18).

Benzo(a)pyrene was found in the 3.5' – 4.0' interval at location MPSB0057 and was vertically delineated at the 4.5' – 5.0' interval.

The PAHs in location MPSB0050 extended from the 2.0' – 2.5' interval to the 9.5' – 10.0' interval. The boring was terminated at 10 feet, so vertical delineation was not achieved.

It is to be noted that, although the PAH concentrations exceeded the RDCSRS, the concentrations are low in comparison to the RDCSRS. In only one location, MPSB0049, was any single PAH found at a concentration greater than 1.0 mg/kg. With the exception of MPSB0049, the PAH concentrations that were found throughout the Former Lagoon Area were less than the residential cleanup criteria used by the NJDEP until 2008.

The PAHs are horizontally delineated except to the northwest, towards Hilliard Creek, and east, towards U.S. Avenue (Figure 18). Horizontal delineation is achieved north of MPSB0050 at location MPSB0069. Horizontal delineation is achieved north of MPSB0049 at locations MPSB0045 and MPSB0046. Horizontal delineation to the southwest is achieved at MPSB0054 and MPSB0055. Horizontal delineation to the south is achieved in the Northern Bridgewood Lake Tract Off-Property locations. As discussed further in Section 4, no additional delineation specific for the PAHs is proposed at this time.

3.1.8 Northern Bridgewood Lake Tract

Six borings were installed in the Northern Bridgewood Lake Tract Off-Property Area. No constituents were found at a concentration greater than the RDCSRS in any sample collected (Figure 7 and Figure 28). No additional sampling of this area is proposed.

3.1.9 Former Gas Station

Four borings were installed in the former Gas Station. Evidence of residual petroleum hydrocarbon contamination was observed in three of the four locations (Figure 7 and Figure 29). The easternmost location, MPSB0063, did not exhibit any evidence of petroleum contamination. No other constituents were found at concentrations greater than the RDCSRS. It is noted that the laboratory results for lead at location MPSB0064 were rejected (Figure 8). However, the XRF analysis of the samples from this boring found lead at concentrations less than 10 mg/kg (Figure 16), supporting a conclusion that lead is not present in this boring at levels above the RDCSRS.

Naphthalene was found at a concentration greater than the RDCSRS in MPSB0061, MPS0062 and MPSB0064 (Figure 7). A TPH concentration of 21,000 mg/kg was found in the sample obtained from the 11.0' – 11.5' interval from boring MPSB0064 (Figure 10).

The naphthalene was vertically delineated in all locations (Figure 9):

- MPSB0061: vertical delineation was achieved at the 20.0' – 20.5' interval
- MPSB0062: vertical delineation was achieved at the 17.0' – 17.5' interval
- MPSB0064: vertical delineation was achieved at the 16.0' – 16.5' interval

The naphthalene and residual petroleum contamination requires additional delineation to the north of MPSB0064. Additional delineation to the west, across U.S. Avenue and towards the 2 Foster Avenue building, is not needed as it can be predicted that residual petroleum contamination is present in those locations. The eastern extent is delineated at MPSB0063.

Further delineation in the residential properties south of the former Gas Station will also be conducted. This additional delineation is discussed in the "Eastern Off-Property Area" section of this document.

3.1.10 Southern Off-Property Area

Three borings were installed in the Southern Off-Property area. No constituents were found in any sample at a concentration greater than the RDCSRS (Figure 7 and Figure 30). No further investigation of this area is proposed.

3.1.11 Eastern Off-Property Area

Six borings were installed in the Eastern Off-Property Area. Three of the borings were installed south of the former Gas Station on the east side of U.S. Avenue, and three were installed north of Berlin Road within U.S. Avenue.

- The southernmost boring location, MPSB0082, and the two northernmost locations, MPSB0079 and MPSB0080) contained no constituents at

concentrations greater than the RDCSRS (Figure 7 and Figure 31), and exhibited no indication of contamination, such as significantly elevated PID readings. A maximum PID response of 344 units was observed in MPSB0082, a maximum of 9.4 units was observed in MPSB0079 and no elevated readings were observed in MPSB0080 (Figure 13). TPH was not detected in any boring (Figure 10). Therefore, it can be concluded that locations MPSB0079 and MPSB0080 represent northern and eastern limits of the residual hydrocarbon contamination, while MPSB0082 provides the southern boundary and eastern limit in the southern portion of the Seep Area..

However, evidence of residual petroleum contamination was observed in the two borings installed just south of the former Gas Station (MPSB0077 and MPSB0078), and the boring installed just east of Former Tank Farm A (MPSB00810. Naphthalene was found in each boring (Figure 7 and Figure 31), and elevated PID readings were observed (Figure 13). Benzo(a)pyrene was also found at a concentration (0.21 mg/kg) just above its RDCSRS (0.2 mg/kg) in the 0.0' – 0.5' interval in MPSB0077 (Figure 7).

The naphthalene was vertically delineated in each location (Figure 9):

- MPSB0077: vertical delineation was achieved in the 19.5' – 20' interval
- MPSB0078: vertical delineation was achieved at the 15.5' – 16.0' interval
- MPSB0081: vertical delineation was achieved at the 18.5' – 19.0' interval

However, additional horizontal delineation of the naphthalene and residual petroleum contamination is needed:

- Delineation to the east and south of MPSB0077 and MPSB0078 is needed to better define the eastern extent of naphthalene and the residual petroleum contamination. The additional delineation south of MPSB0077 and MPSB0078 will also serve to determine the eastern extent of any residual petroleum contamination that may be present across U.S. Avenue from the Seep Area.
- Delineation east of MPSB0081 is needed to determine the extent of the naphthalene and residual petroleum contamination.

No additional delineation of the benzo(a)pyrene is proposed.

3.1.12 Northern Off-Property Area

Four borings were installed in the Northern Off-Property Area. The only constituent found at a concentration greater than the RDCSRS was benzo(a)pyrene, which was found at a concentration of 0.28 mg/kg (RDCSRS 0f 0.2 mg/kg) in the 0.0' – 0.5' interval in boring MPSB0006 (Figure 7 and Figure 32).

The benzo(a)pyrene was vertically delineated in the next deepest interval. The other three borings provide horizontal delineation in all directions except the northeast.

Based on the very low concentration of benzo(a)pyrene, and the absence of any other evidence of contamination, no additional sampling is proposed for the Northern Off-Property area.

3.1.13 Western Off-Property Area

Three borings were installed in the Western Off-Property area, along West Clementon Road. No constituent was found in any sample at a concentration greater than the RDCSRS (Figure 7 and Figure 33). It is noted that the laboratory results for lead in MPSB0029, the northernmost sample location, were rejected (Figure 8). However, the XRF analyses of the samples from this location found lead at a maximum concentration of 26 mg/kg (Figure 16), well below the RDCSRS.

No additional investigation is proposed for this area.

3.2 SILVER LAKE SOIL, SEDIMENT AND SURFACE WATER SAMPLING RESULTS

Silver Lake was identified as a separate study area in the July 2009 RIWP. Additionally, it is the only study area in which sediment and surface water samples were collected during the investigation of the FMP. Therefore, the results of the soil, sediment and surface water sampling in and on the bank of Silver Lake are presented together.

The results of the Silver Lake soil sampling are presented in Table 8. Sediment sampling results are presented in Table 9. Surface water sampling results are presented in Table 10. Since all samples were analyzed for a large number of analytes, additional tables highlighting samples that exceed the media-specific screening criteria have been prepared to assist in the review:

- Table 11 presents the results of sediment samples in which one or more constituents were found at levels greater than the ESC; and

- Table 12 presents the results of surface water samples in which one or more constituents were found at levels greater than the NJDEP FW2 chronic surface water standards for aquatic protection.

The results of the investigation are also presented in several figures:

- Figure 7, previously-referenced, shows that in Silver Lake soil sample SLSB0001 no constituents were found at levels greater than the RDCSRS.

- Figure 8, also previously-referenced, provides all arsenic and lead results for the Silver Lake soil sample.

- Figure 15, previously-referenced, shows the XRF results for lead and arsenic for Silver Lake soil sample SLSB0001.

- Figure 34 presents the results of all sediment samples in which laboratory analysis found one or more constituents at a concentration greater than the ESC.

- Figure 35 presents cross sections of the Silver Lake transects depicting the depth to sediment, the thickness of the soft, fine-grained sediment, the sediment sample depths, and analytical results for arsenic, lead, percent solids and total organic carbon.

- Figure 36 presents the data for surface water samples in which one or more constituents were found at levels greater than the NJDEP FW2 chronic surface water standards for aquatic protection.

3.2.1 Soil Sampling Results

SLSB0001 was collected as part of the Silver Lake sediment sampling and was located at the eastern end of Silver Lake transect SL-7.

No constituents were found in SLSB0001 at a concentration greater than the RDCSRS (Figure 7).

3.2.2 Sediment Sampling Results

As shown on the Silver Lake transect cross-sections in Figure 35, Silver Lake ranges in depth from approximately two feet at the shore to approximately six to seven feet at its deepest point in the center of the lake. The layer of soft, organic-rich sediment is relatively thin throughout the lake. At its thickest, it was measured to be approximately 18 inches deep, and there are locations in Silver Lake where no soft, organic-rich sediment layer was found.

Based on the depth of sample collection and the physical characteristics of the samples collected (Figure 35), it can be concluded that four samples, SLDD0009AA-A, SLDD0010AA-AB, SLDD0013AA-AB, and SLDD0019AA-AB, were collected primarily or exclusively from the soft, organic-rich sediment. In these samples, the percent solids were between 25 percent and 35 percent, and the total organic carbon levels were greater than 50,000 mg/kg (5 percent). Comparatively, samples that can be concluded to have been collected primarily or exclusively from the underlying coarser-grained sediment include SLDD0004AA-AB, SLDD0008AA-AB, SLDD0014AA-AB, SLDD0016AA-AB, SLDD0017AA-AB, SLDD0018AA-AB, and SLDD0025AA-AB. These samples were characterized by much lower total organic carbon levels (approximately 2,000 mg/kg or less) and higher percent solids (greater than 70%).

As shown on Figure 34, three primary categories of constituents were found in Silver Lake sediment at levels greater than the ESC:

1. Metals, including arsenic, cadmium, chromium, copper, lead, mercury, silver and zinc;

2. PCBs and pesticides, including aroclors 1254 and 1260,and 4,4 DDD, 4,4 DDD, 4,4 DDT and heptachlor; and

3. SVOCs, primarily PAHs, but occasionally bis (2-ethylhexyl) phthalate (BEHP).

Approximately one-half the sediment samples obtained from the Silver Lake transects contained no constituents at levels greater than the ESC or contained only one or two constituents at relatively low levels in comparison to the ESC. The highest frequency of detection of constituents at levels greater than the ESC and the highest concentrations of constituents in comparison to the ESC are found in the southern portion of Silver Lake, where Silver Lake discharges to the Silver Lake conveyance. This is presumably a result of the accumulation of sediment containing higher levels of organic carbon at the downstream end of the lake since, as discussed below, the data support a conclusion that the presence and concentration of constituents in sediment are related to the organic carbon level.

Based on the results of the Silver Lake sediment investigation, the nature and extent of the constituents in sediment have been determined:

- Concentrations of constituents are strongly related to the organic carbon content of the sediment:

  - Of the seven sediment samples concluded to be obtained primarily or exclusively from the underlying coarser-grained sediments, four samples (SLDD0008AA-AB, SLDD0014AA-AB, SLDD0016AA-AB, and SLDD0018AA-AB) contained no constituents at levels greater than the ESC, two (SLDD0004AA-AB and SLDD00025AA-AB) contained only low levels of cyanide, and the last (SLDD0017AA-AB) contained only mercury at a level (0.25 mg/kg) only slightly above the ESC (0.2 mg/kg).

  - In comparison, the three samples concluded to have been collected primarily or exclusively from the soft, organic-rich sediments contained a large number of constituents, and the levels of the constituents were, in some instances, the highest found. For example, the lead concentration in SLDD009AA-AB contained the highest lead and zinc concentrations found in Silver lake sediment.

  - SLDD0001AA-AB, and SLDD0002AA-AB, obtained less than 50 feet apart along the same transect, SL-1, exhibit very different characteristics, which are best explained by the difference in organic carbon content. As shown on Figure 35, SLDD0001AA-AB was obtained primarily from the underlying coarse-grained sediment, based on the relatively low organic carbon levels (3,740 mg/kg) and high percent solids (75%). SLDD0002AA-AB, in

comparison, contained a large fraction of the soft, organic-rich sediment, and had lower percent solids (62.3%) and substantially higher organic carbon levels (27,900 mg/kg or almost 3%). SLDD001AA-AB contained only three constituents at levels greater than the ESC, copper cyanide and lead, and the levels, except for cyanide (see below) were relatively low in comparison to the ESC. SLDD002AA-AB, however, contained a wide range of constituents, including pesticides, PCBs, PAHs and other metals, and the concentrations were substantially greater than observed in SLDD001AA-AB.

Based on the above, it can be concluded that in those locations where soft, organic-rich sediments are present, and there is a corresponding increase in the organic carbon levels, low to moderate levels of a variety of constituents, including selected metals, cyanide, PAHs, pesticides and PCBs, will be found. This is reasonable, based on the tendency of these constituents to partition to carbon. This observation and supporting data also support the conclusion that these constituents will not be present in the coarser-grained material with low organic carbon levels.

- Copper and lead are the two metals found most frequently at high concentrations in comparison to their respective ESC (Figure 34). Although, arsenic and zinc are also found relatively frequently, the levels in sediment typically range from just above the ESC to three times the screening criteria. Comparatively, copper and lead are found at concentrations of up to an order of magnitude greater than the screening criteria.

- With the exception of SLDD0017AA-AB, cyanide is found in every sample where one or more constituents are present at levels greater than the ESC, and in three locations it is the only constituent found at levels greater than the ESC (Figure 34). One explanation for its widespread reporting is the extremely low screening criterion (0.0001 mg/kg). In general, cyanide levels in sediment typically ranged from approximately 0.1 mg/kg to 0.3 mg/kg, but in four locations, SLDD0006AA-AB, SLDD0009AA-AB, SLDD0012AA-AB, all along the southwestern shore of the lake, levels were substantially greater than observed in other locations.

- Upstream samples and samples collected from storm water influent locations contain elevated levels of many of the constituents found at levels greater than the screening criteria in the southern portion of the lake (Figure 34):

  - Upstream sample SLDD0024AA-AB, located on Silver Lake transect SL-22, contained elevated levels of several constituents, including arsenic, cyanide, lead, PCBs and pesticides. SLDD0024AA-AB is approximately 1,000 feet upstream of the former Resin Plant Area (the northernmost former FMP operating area).

  - Elevated concentrations of cyanide, selected metals and PAHs were found in sediment samples obtained from the influent locations to Silver Lake on the

western side of the lake, upstream of any known historical operations. SLDD0028, located near the western end of Silver Lake transect SL-7, contained the highest concentrations of PAHs found in any sediment sample. SLDD0030, located in the northwest corner of Silver Lake, contained levels of PAHs that were higher than any other location except SLDD0002AA-AB, located at the southern end of Silver Lake.

- The sample obtained from upstream storm water influent location SLDD0032, located in the northeastern portion of Silver Lake approximately 1,000 feet upstream of the former Resin Plant Area, along Route 561, contained copper, cyanide lead, BEHP and several PAHs at levels greater than the ESC.

Based on the data collected and the interpretation of these data, the nature and extent of constituents in Silver Lake sediment have been adequately characterized during this sampling event. The constituents present at levels above the screening criteria have been identified, and the results support the conclusion that the constituents are present throughout the soft, organic-rich sediment, as a result of partitioning to the organic carbon, at generally low to moderate levels. Higher concentrations of constituents are present in sediment that has accumulated in the southern and southwestern portion of the lake.

Based on the understanding of the distribution of constituents found during this investigation, no additional investigation of sediment is recommended at this time.

3.2.3 Surface Water Sample Results

Eight surface water samples were obtained from transect locations within Silver Lake, and eight samples were obtained from locations where stormwater enters Silver Lake. Both filtered and unfiltered samples were collected. The unfiltered samples were analyzed for all parameters, while the filtered samples were analyzed only for TAL Metals.

One metal, barium, was found in Silver Lake in a filtered sample (SLDW0008) at a concentration greater than the surface water screening criteria (Figure 36). It was found in upstream sample SLDW0008 at a concentration of 240 ug/l, as opposed to the standard of 220 ug/l. No other metals were found at levels greater than the surface water screening criteria in any filtered sample obtained from Silver Lake. The SLDW0008 unfiltered sample also contained cyanide, benzo(a)pyrene and BEHP at levels greater than the surface water screening criteria.

Aluminum was found in two unfiltered samples, SLDW0005 and SLDW0007, obtained from within Silver Lake at a concentration of 115 ug/l, as compared to the screening criterion of 87 ug/l.

PAHs, primarily benzo(a)pyrene, were found at concentrations greater than the surface water criteria in seven of the eight samples obtained from Silver Lake. The

concentrations were generally low (less than 0.5 ug/l), but the standard for benzo(a)pyrene is also low (0.014 ug/l). It is likely, but not confirmed since the filtered samples were not analyzed for PAHs, that the benzo(a)pyrene is not dissolved, but is rather sorbed to fine particles in the surface water samples. Since the samples were obtained immediately above the sediment (see July 2009 RIWP), there was the potential to collect fine particles in the surface water sample.

Aluminum was found in filtered and/or unfiltered samples from all locations where stormwater enters Silver Lake. The highest aluminum concentrations were found in the sample obtained from location SLDW0015, located at the northeastern corner of the lake, near Route 561.

PAHs were found in the unfiltered sample obtained from location SLDW0012 located at approximately the mid-point of the western shore of Silver Lake. As discussed for the PAHs found in the surface water samples from Silver Lake, no filtered results were obtained, but it is likely that the PAHs in the sample from SLDW0012 are associated with solids in the sample.

The constituents and concentrations of the constituents in and entering Silver Lake were determined through the surface water sampling conducted as part of the FMP investigation. The only unknown item is whether or not the PAHs found in samples obtained from Silver Lake and from SLDW0012 are a result of solids in the samples, rather than dissolved. Limited additional sampling of surface water in Silver Lake will be conducted to assess whether the PAHs in the surface water samples were a result of particle entrainment or whether they are present in the dissolved fraction.

3.3 GROUNDWATER SAMPLING RESULTS

As discussed in the July 2009 RIWP, monitoring wells are currently installed in three hydrogeologic units across the FMP:

- The majority of the monitoring wells (29 in total) are shallow (typically 10 to 25 feet deep) and are installed in the Kirkwood-Cohansey aquifer. These wells ranged from very shallow (15 feet deep) to intermediate (25 feet deep) and deeper (MW-33 is 55 feet deep).

- Two wells, MW-30 and MW-37, are installed in the low to moderate permeability Composite Confining Bed and are 60’ – 70 feet deep.

- Seven wells are considered deep (greater than 70 feet) and are installed in the Vincentown aquifer.

Previously-referenced Figure 5 presents the locations of all monitoring wells included in this round of sampling, and is color-coded to differentiate between the formations in which the wells are installed. Table 13 has been prepared to summarize the depth and screened interval of each well.

Groundwater samples were collected in November 2009 and again in August 2010. Both water levels and chemistry data were collected during the groundwater investigation of the FMP. The results are provided in several tables and figures:

- Table 14 provides the well elevation, depth to water and calculated groundwater elevation in each well;
- Table 15 provides the analytical results for all samples collected during both rounds of groundwater sampling;
- Table 16 provides the analytical results for the constituents found in groundwater samples at concentrations greater than the NJDEP Class II-A GWQS;
- Table 17 provides a summary of the field parameter results noted for each sampled monitoring well and the sampling logs are included in Appendix B;
- Figure 37 presents the interpreted groundwater contours for wells installed within the Kirkwood-Cohansey(shallow) aquifer;
- Figure 38 presents the interpreted groundwater contours for the monitoring wells installed in the deeper, underlying Vincentown aquifer;
- Figure 39 presents the results of all constituents found at a concentration greater than the Class II-A NJDEP GWQS in the Kirkwood-Cohansey aquifer;
- Figure 40 presents the results of all constituents found at a concentration greater than the Class II-A NJDEP GWQS in the Vincentown aquifer; and
- Figure 41 presents the total VOC and SVOC Tentatively Identified Compounds (TICs) measured in each well.

3.3.1 Water Levels and Flow Direction

Consistent with previous sampling events, the groundwater flow in both the Kirkwood-Cohansey (shallow) and Vincentown (deeper) aquifer wells is to the southwest. Comparing Figure 37 and Figure 38, groundwater in the deeper formation has a more westerly flow direction than groundwater in the shallow aquifer, but the interpreted flow direction in the deeper aquifer may also be a result of fewer wells from which to obtain water levels.

Surface water elevations were not obtained from Silver Lake, Hilliard Creek or Bridgewood Lake during this phase of sampling. Therefore, the elevations of these surface water bodies have not been incorporated into the contours presented in Figure 22. However, the contours have been prepared to incorporate the predicted influence of these water bodies on shallow groundwater.

As presented on Figure 37, both Hilliard Creek and Bridgewood Lake act as localized discharge locations for shallow groundwater. Shallow groundwater immediately east and west of Hilliard Creek discharges into the creek, while a portion of the groundwater along the eastern side of the FMP discharges to Bridgewood Lake.

On August 2, 2010, an average horizontal hydraulic gradient of approximately 0.0075 ft/ft, (MW-25 to MW-3), was measured in shallow groundwater through the center of the FMP, along the east side of Hilliard Creek. This is consistent with the results of previous investigations.

On August 2, 2010, an average horizontal gradient in the deep wells is approximately 0.0066, as measured from MW-34 to MW-41. Again, this is consistent with previous investigations.

Although there are few co-located shallow and deep wells to compare water level elevations, the interpreted contours show a general downward hydraulic gradient across the FMP. One exception to this general statement is observed west of the 2 Foster Avenue building in the well cluster of MW-15/MW-20/MW-31. In this location, the well installed in the Vincentown formation, MW-31 has a higher water level than the two wells installed in the Kirkwood-Cohansey formation, supporting a conclusion of an upward hydraulic head in this location.

3.3.2 Shallow Groundwater Sampling Results

As presented on Figure 39 a number of constituents were found in shallow groundwater at concentrations greater than the Class II-A GWQS. These include selected metals, PAHs, benzene, a few chlorinated VOCs, selected pesticides and pentachlorophenol. Total dissolved solids (TDS) were also elevated in a number of locations.

Pesticides [primarily benzene hexachloride (BHC) isomers] and PAHs were detected in shallow monitoring wells MW-4, MW-11, MW-12, MW-22, MW-23, MW-29, and MW-32 during one sampling event (November 2009 or August 2010), but not the other. When detected, the concentrations were slightly above the respective GWQS. A possible explanation for the intermittent detections is the presence of solids in the samples. Both the BHCs and PAHs strongly partition to soil as opposed to water, and given the very low GWQS for these constituents, even a small amount of solids entrainment in the sample could result in a reported concentration greater than the GWQS. Additional evaluation of these constituents will be conducted as part of the overall assessment of groundwater quality across the FMP.

Inorganic constituents, including TDS and the metals aluminum, iron, manganese, and sodium, are found at concentrations greater than the Class II-A GWQS in wells installed upgradient of the FMP. These upgradient wells include MW-28 and MW-SCAR. Each of these wells is located outside of the area of known contamination, contains no organic target analytes at levels above the GWQS (Figure 39), contains very low levels of VOC TICs (Figure 41) and exhibits positive redox potential (Table 17), supporting the

conclusion that groundwater in these locations is unaffected by the residual petroleum contamination. However, one or more inorganic constituents are found at levels greater than the GWQS in each well, supporting a conclusion that these constituents may be naturally-occurring.

In addition to the intermittent detections of PAHs and pesticides and the metals found in the up gradient wells, the 2009 and 2010 sampling found several other categories of constituents in shallow groundwater:

- Benzene was found in the former Resin Plant, Tank Farm A, Gas Station and Seep areas.
- Arsenic was found in the former Resin Plant, Tank Farm A, Gas Station and Seep areas.
- Naphthalene was found in the former Resin Plant Area.
- Pentachlorophenol was found in the former Tank Farm B and Lagoon Areas.
- VOCs were found in the former Tank Farm A and Seep areas.
- PAHs were found in the Main Plant, former Tank Farm A and former Tank Farm B areas.

Each is discussed below.

3.3.2.1 Benzene in former Resin Plant, Tank Farm A, Gas Station and Seep Areas

Benzene, presumably associated with the residual petroleum contamination discussed in Section 3.a, "Soil Sampling Results", is present at concentrations greater than the Class II-A GWQS in an area that is generally defined by monitoring wells MW-24 (concentrations ranged from 20 – 45 ug/l during the two sampling events) to the north, MW-26 (23 – 26 ug/l) to the east, MW-21 (1.2 ug/l) to the south and MW-15/MW-20 (2.8 – 16 ug/l) to the west. Note that MW-33, which is co-located with MW-21, is not included in this discussion of shallow groundwater. Although installed in the Kirkwood-Cohansey formation, MW-33 is 55 feet deep, and the benzene concentrations found in MW-33 are most likely associated with the benzene in the Vincentown aquifer (see following section).

The highest benzene concentrations (460 – 790 ug/l) were observed in MW-13R, located in the eastern portion of the Seep Area, and MW-11 (99 – 190 ug/l) and MW-12 (220 – 250 ug/l), both located in the former Tank Farm A area.

It is not known whether benzene is present in shallow groundwater across the entire area described above. As discussed in Section 3.a, "Soil Sampling Results", benzene was only intermittently found at levels greater than 2 mg/kg in soil samples collected

from the area of residual petroleum contamination. A similar pattern may be true of the benzene in groundwater, but this cannot at this time be determined.

Measurable LNAPL was observed in MW-1 (0.04' product thickness) and MW-11 (0.49' product thickness) during the December 2009 sampling round and in MW-11 during both the December 2009 (0.49' product thickness) and August 2010 (0.13' product thickness) sampling rounds. These wells are located in the Former Tank Farm A and Seep Areas. Measureable LNAPL was also noted in MW-26 (0.02' product thickness) located along United States Avenue in the Former Gasoline Service Station. Representative samples of the product were collected and submitted to the laboratory for Hydrocarbon Product Identification (GC) by Method 8015B. The fingerprint analysis identified the samples as containing a petroleum product that most closely resembles mineral spirits. This is consistent with results obtained during previous fingerprinting analysis. The product sample and reference chromatograms are presented in Appendix C.

As noted in the product thickness measurements above, a small volume of LNAPL was collected from each well. After the sample for fingerprint analysis was collected, any excess sample volume, as applicable, was submitted for physical parameters analysis such as specific gravity, density and viscosity. These analytical results will be discussed in greater detail in a forthcoming site-specific groundwater report for the FMP.

After the LNAPL was collected, the well was purged and dissolved-phase groundwater samples collected in accordance with the July 2009 Work Plan.

3.3.2.2 Arsenic in Former Resin Plant, Tank Farm A, Gas Station and Seep Areas

Arsenic was found at low to moderate concentrations (3.4 ug/l in MW-1 to 14.8 ug/l in MW-21) in a number of monitoring wells located in the former Resin Plant, Tank Farm A, Gas Station and Seep Areas. The distribution of the arsenic in groundwater, when compared to the distribution of arsenic in soil, supports a conclusion that the arsenic is not present in groundwater as a result of an anthropogenic arsenic source in soil.

As discussed in section 3a, "Soil Sample Results", arsenic is not found at elevated concentrations across the FMP. With few exceptions (one location in former Resin Plant, along the proposed Silver Lake conveyance bypass route, former Tank Farm B and adjacent to Hilliard Creek), arsenic was not found at levels exceeding its screening criteria. Additionally, the wells installed in the locations where elevated arsenic concentrations were found in soil did not contain elevated concentrations of arsenic:

- Arsenic concentrations were less than the GWQS in MW-16, MW-17 and MW-18, installed in former Tank Farm B.

- Arsenic concentrations were less than the GWQS in MW-15 and MW-20, installed in the Main Plant area, adjacent to the Silver Lake conveyance.

- Arsenic was found in only the August 2010 sampling event at a concentration (4.1 ug/l) slightly greater than the GWQS in MW-14, located adjacent to Hilliard Creek.

- Arsenic was not found at levels greater than the GWQS in MW-24, located in the former Resin Plant Area.

One explanation for the arsenic in groundwater could be entrainment of particles in the samples. Although the wells were redeveloped, this remains a possibility. However, low flow sampling was conducted and, with few exceptions (see Table 17, Field Parameters), turbidity levels in shallow groundwater samples were not highly elevated across the FMP.

A more likely conceptual model for the arsenic found in shallow groundwater across the FMP is that the reducing conditions created by the residual petroleum contamination have affected the partitioning of arsenic between the solid and dissolved phases, and the arsenic is present as a result of dissolution of naturally-occurring arsenic in the soil. The following briefly summarizes the basis for this observation.

As extensively documented in the literature, the partitioning of arsenic between the solid and dissolved phases is controlled to a large degree by the arsenic adsorption and coprecipitation with iron oxides and iron hydroxyoxides. Further, under oxidizing conditions, the dominant species of arsenic present is most likely to be arsenate [As(V)], which can also sorb to other materials, including clays. Therefore, under typical conditions in groundwater, natural background concentrations of arsenic in soil are not likely to result in elevated dissolved-phase concentrations of arsenic.

Under reducing conditions, however, the iron oxides and iron oxyhydroxides undergo reductive dissolution, and the coprecipitated and sorbed arsenic is released to the dissolved phase. Additionally, the arsenate is typically converted to arsenite [As(III)], which does not sorb as effectively to matrices other than iron oxides and iron oxyhydroxides. The result is a greater partitioning to the dissolved phase than occurs under oxidizing conditions. Thus, under reducing conditions, natural background levels of arsenic in soil can result in dissolved-phase concentrations of arsenic at levels greater than the GWQS.

When normal oxidizing conditions are encountered, elevated arsenic concentrations in groundwater would not be predicted. This is supported by the data from the two most recent rounds of sampling. None of the shallow wells in which the redox values were positive (MW-16, MW-17, MW-18, MW-20, MW-23, MW-24 and MW-28) contained arsenic at a concentration greater than the GWQS.

3.3.2.3 Naphthalene in Former Resin Plant Area

Naphthalene was found in MW-24 at levels greater than the Class II-A GWQS. As discussed in Section 3.a, “Soil Sampling Results”, naphthalene is associated with the

residual petroleum contamination found in several study areas of the FMP. Although present in soil in a number of locations within the residual petroleum contamination, naphthalene was found in shallow groundwater only in MW-24.

3.3.2.4 Pentachlorophenol in Former Tank Farm B and Lagoon Areas

Pentachlorophenol was found in monitoring wells MW-17 and MW-18, located in the former Tank Farm B Area at concentrations ranging from 3.7 ug/l to 5 ug/l (GWQS of 0.3 ug/l). Pentachlorophenol concentrations remained generally constant between the November 2009 and August 2010 sampling events.

Pentachlorophenol was also found in monitoring wells MW-2, MW-4 and MW-23, located in the former Lagoon Area at concentrations ranging from 0.64 ug/l to 17 ug/l.

The presence of pentachlorophenol in groundwater in this location supports a conclusion that pentachlorophenol may be present in saturated soil. Both MW-17 and MW-18 are fifteen feet deep and screened from approximately five to 15 feet below ground surface. However, the soil borings in this location (see Section 3.a) were terminated, based on the sample screening and collection protocol, at a maximum depth of 5.5' – 6.0'. Additional saturated soil sampling is recommended to assess whether and at what levels pentachlorophenol may be present.

Monitoring wells MW-2 and MW-23, which are located on the downgradient perimeter of the former Lagoon Area, contained only low levels of pentachlorophenol (0.64 – 1.6 ug/l). Based on the very high octanol/water partitioning coefficient (Log K_{ow} = 5.01), it can be predicted that no significant transport of pentachlorophenol will have occurred beyond these two wells. Additionally, the pentachlorophenol in MW-4 is delineated to ND at downgradient well MW-38.

3.3.2.5 VOCs in Former Tank Farm A and Seep Areas

Two VOCs, vinyl chloride, 1,1 dichloroethene (DCE), and 1,2 dichloroethane (DCA) were found in the former Tank Farm A and Seep Areas at concentrations greater than the GWQS.

The 1,1 DCE was found in MW-1 at a concentration (2 ug/l) slightly greater than the GWQS (1 ug/l) during the August 2010 sampling event. It was not detected at a concentration greater than the GWQS during the November 2009 sampling event.

The 1,2 DCA was found only in MW-22. During the August 2010 sampling event, it was detected at a level (2.8 ug/l) slightly above the GWQS (2 ug/l). The concentration found in November 2009 (14 ug/l) was slightly higher.

Vinyl chloride was found in the former Tank Farm A area in monitoring wells MW-11, MW-12 and MW-19, and in the Seep Area in MW-14. Vinyl chloride is typically found as a reductive dechlorination degradation product of tetrachloroethene (PCE) or

trichloroethene (TCE). Neither of these constituents, nor the degradation intermediate cis-1,2 dichloroethene (DCE), were found in soil or groundwater during this sampling event, supporting the conclusion that any historic release of PCE or TCE has undergone reductive dechlorination.

The 1,1 DCE and 1,2 DCA were each found in only one monitoring well and were at levels approaching the GWQS during the August 2010 sampling event. With the exception of MW-14, vinyl chloride was not found in any shallow well downgradient of the former Tank Farm A area. The vinyl chloride concentration in MW-14 in August 2010 (2.4 ug/l) approached the GWQS (1 ug/l). Additional degradation of the vinyl chloride can be predicted.

3.3.2.6 PAHs in Main Plant and Former Tank Farm A and B Areas

PAHs were found at concentrations greater than the GWQS during both sampling events in MW-15, located in the Main Plant Area, MW-16, located in the former Tank Farm B area, and MW-19, located in the former Tank Farm A area.

In reviewing the field parameters for each of these wells (Table 17), it can be concluded that some, but not all of the PAHs found in these three wells is likely associated with particle entrainment in the groundwater samples. For example, the final turbidity reading in MW-15 during the August 2010 sampling event was 36.6 ntu. During this event, individual PAHs were found at concentrations ranging from 1 ug/l to 6.5 ug/l. During the November 2009 sampling event, lower turbidity levels and lower PAH levels were observed, supporting a conclusion that the PAHs in MW-15 are partially a result of particle entrainment.

However, turbidity levels were not excessive during either sampling event in MW-16 or MW-19. Additional evaluation of these results will be conducted as part of the overall assessment of groundwater quality across the FMP.

3.3.3 Groundwater Sampling Results, Deep Groundwater

Consistent with previous sampling events, benzene was found in the deeper groundwater wells at concentrations significantly greater than found in shallow groundwater. For example, the concentration of benzene in MW-30, screened in the composite confining layer at approximately 50’ – 55’, was 3,900 ug/l. This concentration is five times the highest concentration observed in shallow groundwater (790 ug/l in MW-13R in November 2009).

Benzene was found in deep groundwater more than 1,000 feet south of MW-30, at MW-41, where benzene was found at concentrations of 580 ug/l and 360 ug/l in November 2009 and August 2010, respectively. The presence of benzene in deep monitoring wells MW-35 and MW-36 support a conclusion that the benzene in deep groundwater is continuous between MW-30 and MW-41.

Based on the data collected during the most recent sampling events, the benzene is present both immediately above and below the composite confining layer. MW-33, installed in the Kirkwood-Cohansey formation, but at a depth of 55 feet bgs, contained benzene at concentrations of 100 ug/l and 78 ug/l in November 2009 and August 2010, respectively. As stated previously, deeper wells installed in the Vincentown formation, MW-35, MW-36 and MW-41, also contained benzene.

The conclusion that the benzene in MW-33 is associated with the benzene found in deep groundwater and not shallow is based on the absence of benzene in co-located shallow wells MW-21 (screened from 5' – 15') and MW-22 (screened from 25' – 35'). MW-21 contained benzene at 1.2 ug/l during the August 2010 sampling, and was not found at a concentration above the GWQS in December 2009, the initial sampling event for MW-21. Benzene was found in MW-22 at a concentration of 1.4 ug/l in November 2009, but was not found at a concentration greater than the GWQS in August 2010. If the benzene in MW-33 was associated with the benzene in shallow groundwater, these wells would be predicted to contain benzene, also.

The source of the benzene in deep groundwater has not been identified. The deep borings installed near the former production well locations found no evidence of soil contamination at depth (Figures 7 and 9). Additionally, there is no evidence of significant benzene contamination in shallow groundwater or saturated soil in the former Resin Plant or Tank Farm A areas:

- Borings installed as part of the investigation of these areas found, based on PID readings (Figure 13), soil sample results (Figure 9) and visual observations, that the residual petroleum contamination in this area extends no deeper than approximately 25 feet.

- The deepest interval in which benzene was found was 12.0' – 12.5' (4.1 mg/kg in MPSB0014), and benzene was ND with reasonably low detection limits at depths of 20 feet or less.

- Although benzene was found in shallow groundwater in the former Resin Plant and Tank Farm A areas, the highest concentrations (250 ug/l in MW-12 and 45 ug/l in MW-24) are one to two orders of magnitude less than the concentrations found in MW-30.

These data support a conclusion that the FMP is not a likely source of the benzene in deep groundwater.

However, MW-34, installed in the Vincentown formation, up gradient of MW-30, contained no benzene, which would support a conclusion that the benzene does not originate up gradient of the FMP. It is possible, however, that MW-34 is not positioned correctly, vertically or horizontally, to intersect the up gradient benzene, if it exists.

Other findings from the investigation of deep groundwater include:

- In addition to the elevated benzene levels, MW-30 also contained several metals, vinyl chloride and TDS at concentrations greater than the GWQS.

- Benzo(a)pyrene was found in several deep wells, MW-31, MW-34 and MW-35 in the first sampling event, but not during the second.

- Iron and/or manganese were found in several wells at levels greater than the GWQS.

The groundwater exceedances for the Vincentown Aquifer are presented on Figure 40.

These findings will be further evaluated as part of the overall assessment of FMP groundwater. As discussed with the EPA Regional Project Manager, Sherwin-Williams is continuing to evaluate the groundwater data and will provide to the EPA a proposal for additional groundwater investigation in a separate submission.

SECTION 4.0
PROPOSAL FOR ADDITIONAL INVESTIGATION

As discussed in Section 3.a, “Soil Sampling Results”, additional delineation of soil is needed in several FMP study areas. These are:

- Former Resin Plant Area: Additional characterization is needed to horizontally delineate the arsenic and lead found in MPSB0025. Additional soil borings will be installed to the north and south of MPSB0025. The samples will be analyzed with and XRF and, based on the results of the XRF analyses, additional step-out borings may be installed.

- Former Tank Farm A: Additional characterization of soil to the east of U.S. Avenue is needed to delineate the residual petroleum contamination in MPSB0015 and MPSB0081. As discussed further, two additional soil borings are proposed east of U.S. Avenue and north of Berlin Road to conduct this delineation. One boring will be installed south of MPSB0081 and the other will be installed southeast of MPSB0013.

- Main Plant Area: Additional characterization is needed to evaluate:

  - The horizontal extent of arsenic, lead and PCBs along the proposed Silver Lake conveyance bypass route;

  - The vertical extent of metals and PCBs in MPSB0033; and

  - The extent to which fill material, possibly containing arsenic, lead, PAHs, or PCBs, is present in the parking area west of the 2 Foster Avenue building and north of the 10 Foster Avenue building.

  A series of borings will be installed along the Silver Lake conveyance, east and west of the borings initially installed to support the proposed Brandywine Silver Lake Conveyance Bypass Project, beginning at the Silver Lake discharge and ending at Foster Avenue. XRF analysis for arsenic and lead will be conducted. Additional borings will be installed in the parking areas west of the 2 Foster Avenue building and north and west of the 10 Foster Avenue building. Finally, additional vertical delineation will be conducted at MPSB0033.

- Former Tank Farm B: Additional characterization is needed to:

  - Define the horizontal extent of arsenic and lead found in MPSB0038 to the west and northwest;

  - Determine the vertical extent of arsenic found in MPSB0039; and

- Determine whether and to what extent pentachlorophenol may be present in saturated soil in the vicinity of MW-17 and MW-18 (Figure 39).

  Additional soil borings will be installed north and west of MPSB0038. Also, a boring will be installed in the former location of MPSB0039 to both determine the vertical extent of the arsenic and evaluate whether pentachlorophenol is present in saturated soil.

- Seep Area: Additional characterization is needed to determine the horizontal extent of the residual petroleum contamination south and west of MPSB0018 and east of MPSB0047.

  Additional step-out borings will be installed west and south of MPSB0018. The borings will be field screened with a PID and, based on the PID results and visual observations, additional borings may also be installed. An additional boring will also be installed east of MPSB0047. This boring will be installed on the FMP along the west side of U.S. Avenue, and it will be field screened with the PID. Based on the PID results and visual observations, an additional step-out boring may be installed east of U.S. Avenue.

- Former Lagoon Area: Additional characterization is needed to vertically and horizontally delineate the extent of the pentachlorophenol found in several soil borings.

  Additional vertical delineation for pentachlorophenol will be conducted at MPSB0067 and MPSB0068. Additional horizontal delineation of the pentachlorophenol found in MPSB0067 and MPSB0068 at depth will also be conducted. Additional soil borings will be installed to delineate the pentachlorophenol found in MPSB0049 in the 2.5'- 6.0' interval and in the areas west of MPSB0056.

- Eastern Off-Property Area: Additional characterization is needed in the southern portion of the Eastern Off-Property Area to determine whether and to what extent the residual petroleum contamination may extend south from the former Gas Station Area and east from the Seep Area.

  Two additional borings will be installed west of MPSB0077, southwest of MPSB0078 and northeast of MPSB0082.

- Silver Lake: Additional surface water sampling will be conducted in Silver Lake to assess whether the PAHs found in some of the surface water samples at levels greater than the surface water screening criteria are a result of particle entrainment or were actually dissolved.

  No additional sediment sampling is proposed at this time. The nature and extent of constituents in sediment have been determined during this phase of

investigation. Additional sampling may be conducted to support the risk assessment or feasibility study.

- Groundwater: It is acknowledged that additional groundwater characterization is needed, however the scope of the additional characterization is still under evaluation. A proposal for additional groundwater characterization will be provided to the EPA in a separate submission.

Presented in the following sections are discussions of the specific locations of each boring, the sample collection protocol and the constituents that will be included as analytical parameters. All proposed soil sampling locations are shown on Figure 42.

4.1 FORMER RESIN PLANT AND MATERIALS STORAGE AREA

The objective of the supplemental soil sampling in the former Resin Plant Area is to horizontally delineate the lead found in MPSB0025 at the 3.5' – 4.0' interval. Low levels of PAHs were found in the 0.0' – 0.5' interval in MPSB0025 and will be included in the analytical parameters for samples from the 0.0' – 0.5' interval in the borings installed north and south of MPSB0025.

4.1.1 Soil Boring Locations

As shown on Figure 42, two borings will be initially installed to delineate the lead in MPSB0025. One boring will be approximately 20 feet north of MPSB0025 and the other approximately 20 feet south of MPSB0025.

4.1.2 Sample Screening, Collection and Analysis Protocol

The borings will be installed to a depth of five feet. Samples from the 0.0' – 0.5', 1.5' – 2.0', 3.5' – 4.0 and 4.5' – 5.0 intervals will be analyzed with the XRF. If no samples are found to contain arsenic or lead at a concentration greater than the RDCSRS, the sample from the 0.0' – 0.5' interval in each boring will be collected and analyzed for TCL SVOCs and the sample from the 3.5' – 4.0' interval will be analyzed for TAL Metals.

If the sample from the 0.0' – 0.5' or 1.5' – 2.0 intervals in one or both borings is found to contain arsenic or lead at a concentration greater than the RDCSRS, that sample will be collected and analyzed for TAL Metals. If the sample from the 3.5' – 4.0' interval contains arsenic or lead at a concentration greater than the RDCSRS, and the sample from the 4.5' – 5.0' interval does not, the sample from the 4.5' – 5.0' interval will be collected for laboratory analysis for TAL Metals.

If the sample from the 4.5' – 5.0' interval is found to contain arsenic or lead at a concentration greater than the RDCSRS, an additional core will be collected, and the sample from the 6.5' – 7.0' interval will be analyzed with the XRF. If the sample does not contain arsenic or lead at a concentration greater than the RDCSRS, the sample will be collected for analysis for TAL Metals. If arsenic or lead is present at a concentration

greater than the RDCSRS, the sample from the 8.5' – 9.0' interval will be analyzed with the XRF. The XRF screening will continue until arsenic and lead are not found at a concentration greater than the RDCSRS. This sample will be collected for laboratory analysis for TAL Metals.

4.2 FORMER TANK FARM A

The objective of the additional sampling in the former Tank Farm A area is to define the eastern extent of the residual petroleum contamination. The results of the initial phase of investigation of the residual petroleum contamination determined that it was defined by elevated PID readings, elevated TPH concentrations and, in some cases, naphthalene and/or benzene at concentrations greater than the RDCSRS. It was also determined that arsenic and lead are not found at levels greater than their RDCSRS in the residual petroleum contamination.

4.2.1 Soil Boring Locations

One soil boring will be installed on the east side of U.S. Avenue south of MPSB0015 and MSB0081, and one will be installed on the eastern side of U.S. Avenue across from MPSB0013.

4.2.2 Sample Screening, Collection and Analysis Protocol

Each boring will be installed to the top of the water table. The bottom six inches of each two-foot interval in the unsaturated cores will be analyzed with an XRF and field screened with a PID. If arsenic or lead is not found at levels above the RDCSRS, no elevated PID readings are observed and there is no visual indication of contamination (sheen or staining), the first sample collected will be from the top six inches above the water table.

If XRF results are greater than the RDCSRS, elevated PID readings are observed, or there is visual evidence of contamination, samples will be collected from the interval in which the evidence of contamination is present. Samples collected because arsenic or lead are found with the XRF at a level greater than the RDCSRS will be analyzed for TAL Metals. Samples collected because of elevated PID readings or visual evidence of residual petroleum contamination will be analyzed for TPH, TCL VOCs and TCL SVOCs.

The boring will be extended at least five feet (one Geoprobe core length) into the water table. The core will be screened with a PID in one-foot increments. The sample with the highest PID reading will be collected and analyzed for TPH, TCL VOCs and TCL SVOCs. If elevated PID readings or other evidence of contamination are not observed in the bottom of the core, that sample will be collected for analysis for TPH, TCL VOCs and TCL SVOCs.

If elevated PID readings or visual evidence of contamination is found in the one foot interval at the bottom of the five foot core, another core will be obtained. The field screening and observation protocol described for the initial five foot core will be conducted on the second core. This process will continue until there is no evidence of residual petroleum contamination in the bottom one foot interval of the deepest core.

If evidence of residual petroleum contamination is found in one or both of the two borings, an additional step out boring will be installed approximately 25 feet east of the boring (or borings) in which the evidence of residual petroleum contamination was found. The same sample screening and collection protocol discussed for the original borings will be used.

4.3 MAIN PLANT AREA

The objectives of the additional investigation of the Main Plant Area are to: 1) delineate the arsenic, lead and PCBs found along the Silver Lake conveyance bypass; 2) better characterize the soil beneath the parking areas west of the 2 Foster Avenue building and north of the 10 Foster Avenue building; and 3) complete vertical delineation of the arsenic and/or lead in MPSB0033. It was determined during the most recent investigation of the Main Plant that the constituents found in these areas at levels greater than the RDCSRS were arsenic and lead, PCBs and PAHs.

4.3.1 Soil Boring Locations

Soil borings will be installed in three general locations:

1. East and west of the locations of the borings originally installed to support the proposed Brandywine Silver Lake Conveyance Bypass Project. As shown on Figure 42, nine additional borings will be installed along the Silver Lake conveyance, beginning at the Silver Lake outfall and continuing to Foster Avenue. The borings will be installed on approximate 50-foot centers, approximately 25 – 30 feet to each side of the borings installed as part of the proposed Brandywine Silver Lake Conveyance Bypass Project.

2. The parking areas west of the 2 Foster Avenue building and north and west of the 10 Foster Avenue building. As shown on Figure 42, seven additional borings, including one south of location MPSB0032, two east and four west of the proposed bypass route will be installed to better characterize soil conditions in these parking areas.

3. The former location of boring MPSB0033. A boring will be installed in this location and extended beyond the 4.5’ – 5.0’ interval at which MPSB0033 was originally completed.

4.3.2 Sample Screening, Collection and Analysis Protocol

The borings installed to delineate the constituents found in soil along the Silver Lake conveyance bypass will be installed to at least a depth of 10 feet (two core lengths). This depth is based on results from the initial borings installed along the Silver Lake conveyance in which arsenic and/or lead was found in either laboratory or XRF results in the 9.5' – 10.0' interval.

Samples will be collected from the 0.0' – 0.5', 1.5' – 2.0', 5.5' – 6.0 and 9.5' – 10.0' and will be analyzed for PCBs, TAL Metals, and TCL SVOCs. Samples from 3.5' – 4.0', 7.5' – 8.0' and 9.5' – 10' will be screened with the XRF. If the sample from the 9.5' – 10.0' foot interval is found to contain arsenic or lead at a concentration greater than the RDCSRS, another core will be obtained. The sample from the 11.5' – 12.0' interval will then be screened with the XRF. If arsenic or lead is not found at a concentration greater than the RDCSRS, the sample will be collected and submitted to the laboratory for TAL Metals analysis. If XRF screening detects arsenic or lead at a level greater than the RDCSRS, then the samples from the 13.5' – 14.0' interval will be screened with the XRF. This will continue until arsenic and lead are not detected at concentrations greater than the RDCSRS and then a sample will be collected and submitted to the laboratory for TAL Metals analysis .

Note that no step-out borings will be installed based on the results of the XRF analyses. As shown on Figure 42, borings will be installed throughout the parking areas east and west of the Silver Lake conveyance, and the data from these borings will be used to delineate the results along the Silver Lake conveyance.

Note also that Sherwin-Williams is not proposing to collect soil samples for pesticides. Although aldrin and dieldrin were found at levels greater than their respective RDCSRS, they were not found extensively and were found at low levels.

The borings installed within the parking areas will be initially installed to a depth of five feet (one Geoprobe core). Samples will be collected from the 0.0' – 0.5' and 1.5' – 2.0' intervals and analyzed for PCBs, TAL Metals and TCL SVOCs. The samples from the 3.5' – 4.0' and 4.5' – 5.0' intervals will be analyzed with the XRF. If neither sample is found to contain arsenic or lead at a concentration greater than the RDCSRS, the sample from the 3.5' – 4.0' interval will be collected and analyzed for PCBs, TAL Metals and TCL SVOCs.

If either interval is found to contain arsenic or lead at a concentration greater than the RDCSRS, the sample from the 4.5' – 5.0' interval will be collected and analyzed for PCBs, TAL Metals and TCL SVOCs. If XRF analysis of the sample from the 4.5' – 5.0' interval finds arsenic or lead at a concentration greater than the RDCSRS, another core will be obtained, and the sample from the 7.5' – 8.0' interval will be collected and analyzed with the XRF. If arsenic or lead is present at a concentration greater than the RDCSRS in the 7.5' – 8.0' interval, the boring will be extended another two feet and the sample from the 9.5' – 10.0' interval will be collected and analyzed with the XRF. This

will continue until XRF analysis finds that arsenic and lead are not present at levels greater than the RDCSRS. This sample will be collected for laboratory analysis for PCB, TAL Metals and TCL SVOCs.

A 5' – 10' core will be obtained at the location of MPSB0033. The sample from the 5.5' – 6.0' interval will be collected and analyzed for PCBs, TAL Metals and TCL SVOCs. The sample from the 7.5' – 8.0' interval will be screened with the XRF. If arsenic or lead is not detected at a concentration greater than the RDCSRS, the sample will be collected and submitted to the laboratory for analysis for PCBs, TAL Metals and TCL SVOCs. If arsenic or lead is present at a concentration greater than the RDCSRS in the 7.5' – 8.0' interval, then the sample from the 9.5' – 10.0' interval will be screened with the XRF. If the sample from the 9.5' – 10.0' interval is found to contain arsenic or lead at a concentration greater than the RDCSRS, then another core will be obtained and the XRF screening of each two-foot interval will continue until XRF screening finds that arsenic and lead are not present at levels greater than the RDCSRS. The bottom-most sample not exceeding the RDCSRS will be submitted to the laboratory for PCB, TAL Metals and TCL SVOCs analysis.

4.4 FORMER TANK FARM B

The objectives of the supplemental investigation in former Tank Farm B are to horizontally delineate the arsenic and lead found in MPSB0038, vertically delineate the arsenic found in MPSB0039, and determine whether pentachlorophenol is present in saturated soil in the vicinity of MW-17 and MW-18.

The most recent investigation in the former Tank Farm B area found arsenic, lead, some PAHs and one PCB, aroclor 1254, at concentrations greater than the RDCSRS. The PAHs and PCB were very low in comparison to the RDCSRS. However, for purposes of completing delineation to the west and northwest of MPSB0038, both PCBs and TCL SVOCs will be included in the analytical parameters for the samples collected for laboratory analysis.

4.4.1 Soil Boring Locations

As shown on Figure 42, additional soil borings will be installed in three locations:

1. One boring will be installed northwest of, and one boring will be installed northeast of MPSB0038 to delineate the arsenic, lead, PAHs and PCBs;

2. A boring will be installed at location MPSB0039 and extended into the saturated zone to complete vertical delineation of the arsenic and assess the potential for pentachlorophenol to be present.

4.4.2 Sample Screening, Collection and Analysis Protocol

The borings installed to delineate the constituents found in MPSB0038 will be installed to a depth of five feet (one Geoprobe core). Vertical delineation of the constituents in MPSB0038 was achieved at the 3.5' – 4.0' interval and, five feet is expected provide adequate depth to complete the delineation.

Samples from the 0.0' – 0.5', 2.0' – 2.5, 3.5' – 4.0 and 4.5' – 5.0' intervals will be analyzed with the XRF. The sample from the 0.0' – 0.5' and 2.0' – 2.5' intervals will be collected for analysis for PCBs, TAL Metals, and TCL SVOCs.

If none of the samples are found to contain arsenic or lead at a concentration greater than the RDCSRS, the sample from the 3.5' – 4.0' interval will be collected and analyzed for PCBs, TAL Metals and PCL SVOCs.

If either the 3.5' – 4.0' or 4.5' – 5.0' interval is found to contain arsenic or lead at a concentration greater than the RDCSRS, the sample from the 4.5' – 5.0' interval will be collected and analyzed for PCBs, TAL Metals and TCL SVOCs. If XRF analysis of the sample from the 4.5' – 5.0' interval finds arsenic or lead at a concentration greater than the RDCSRS, another core will be collected, and the sample from the 6.5' – 7.0' interval will be collected and analyzed with the XRF. If arsenic or lead is present at a concentration greater than the RDCSRS in the 6.5' – 7.0' interval, the sample from the 8.5' – 9.0' interval will be collected and analyzed with the XRF. This will continue until XRF analysis finds that arsenic and lead are not present at levels greater than the RDCSRS. The bottom sample will be collected for laboratory analysis for PCB, TAL Metals and TCL SVOCs.

The boring installed to delineate arsenic in MPSB0039 and assess the potential for pentachlorophenol to be present will be extended to a depth of 15 feet, the depth of both MW-17 and MW-18. The boring will be field screened with the XRF beginning at the 7.5' -8.0' interval (delineation was not achieved in MPSB0039 in the 5.5' – 6.0' interval), and at the bottom six inches of each subsequent two foot interval. The shallowest interval at which arsenic and lead are not found at levels greater than the RDCSRS will be collected for analysis for TAL Metals.

Samples will be collected from the 7.5' – 8.0', 10.5' – 11.0' and 14.5' – 15.0' intervals and analyzed for pentachlorophenol.

4.5 SEEP AREA

The objective of the supplemental investigation of the Seep Area is to define the horizontal extent of the residual petroleum contamination south and west of MPSB0018 and east of MPSB0047. The results of the initial phase of investigation of the residual petroleum contamination determined that it was defined by elevated PID readings, elevated TPH concentrations and, in some cases, naphthalene and/or benzene at concentrations greater than the RDCSRS. It was also determined that arsenic and lead

are not found at levels greater than their RDCSRS in the residual petroleum contamination.

4.5.1 Soil Boring Locations

Three additional soil borings will be installed for purposes of delineating the residual petroleum contamination. One boring will be installed approximately 50 feet south of MPSB0018, one will be installed approximately 100 feet west of MPSB0018, and one will be installed approximately 50 feet east of MPSB0047, on the west side of U.S. Avenue.

4.5.2 Sample Screening, Collection and Analysis Protocol

The protocol described for the former Tank farm A area will be used for each of the three delineation borings.

All borings will be advanced to the top of the water table. For the delineation borings installed south and west of MPSB0018, this is predicted to be a relatively shallow depth, while the delineation boring east of MPSB0047 will be deeper.

The bottom six inches of each two-foot interval in the unsaturated cores will be analyzed with an XRF and field screened with a PID. If arsenic or lead are not found at levels above the RDCSRS, no elevated PD readings are observed and there is no visual indication of contamination (sheen or staining), the first sample collected will be from the top six inches above the water table.

If XRF results are greater than the RDCSRS, elevated PID readings are observed, or there is visual evidence of contamination, samples will be collected from the interval in which the evidence of contamination is present. Samples collected because arsenic or lead are found with the XRF at a level greater than the RDCSRS will be analyzed for TAL Metals. Samples collected because of elevated PID readings or visual evidence of residual petroleum contamination will be analyzed for TPH, TCL VOCs and TCL SVOCs.

The boring will be extended at least five feet (one Geoprobe core length) into the water table. The core will be screened with a PID in one-foot increments. The sample with the highest PID reading will be collected and analyzed for TPH, TCL VOCs and TCL SVOCs. If elevated PID readings or other evidence of contamination are not observed in the bottom of the core, that sample will be collected for analysis for TPH, TCL VOCs, and TCL SVOCs.

If elevated PID readings or visual evidence of contamination is found in the one foot interval at the bottom of the five foot core, another core will be obtained. The field screening and observation protocol described for the initial five foot core will be conducted on the second core. This process will continue until there is no evidence of residual petroleum contamination in the bottom one foot interval of the deepest core.

If evidence of residual petroleum contamination is found in any of the delineation borings, additional step-out borings will be installed. The step-out borings will be located approximately 25 feet away from the original delineation boring (or borings) in which the evidence of residual petroleum contamination was found. The same sample screening and collection protocol discussed for the original borings will be used.

4.6 FORMER LAGOON AREA

The objective of the supplemental investigation of the former Lagoon Area is to delineate the pentachlorophenol found in several soil borings. Although PAHs were found at levels greater than the RDCSRS in some borings, the concentrations were very low in comparison to the RDCSRS and, with the exception of MPSB0049, the PAH concentrations that were found throughout the Former Lagoon Area were less than the residential cleanup criteria used by the NJDEP until 2008. Therefore, no additional delineation for PAHs are proposed.

4.6.1 Soil Boring Locations

As shown on Figure 42, seven additional borings will be installed in the former Lagoon Area. Four borings will be installed to the north and west of locations MPSB0049 and MPSB0056 to horizontally delineate the pentachlorophenol found in these locations, and three other borings will be installed to the north, east and west of locations MPSB0067 ad MPSB0068 to horizontally delineate the pentachlorophenol found at depth in these two locations.

4.6.2 Sample Screening, Collection and Analytical Protocol

There is no mechanism to meaningfully field screen or analyze the samples for pentachlorophenol. Therefore, sample intervals have been selected based on the results obtained during the most recent investigation of the former Lagoon Area. Contingent vertical delineation samples are proposed to ensure to the extent possible that vertical delineation is achieved in each location during this sampling event. As discussed for each location, these contingent samples will not be analyzed unless samples from the shallower intervals, which may be analyzed on an expedited basis to ensure holding times are met, are found to contain pentachlorophenol at concentrations greater than the RDCSRS.

1. The boring located west of MPSB0056 will be completed to five feet. A sample will be collected from the 0.0’ – 0.5’ interval, with contingent samples collected from the 2.0’ – 2.5’ and 4.5’ – 5.0’ intervals. To complete delineation of the pentachlorophenol found in MPSB0056, the sample from the 0.0’ – 0.5’ interval will be analyzed. If this sample does not contain pentachlorophenol at levels greater than the RDCSRS, the contingent samples will not be analyzed. If the initial sample contains pentachlorophenol at a concentration greater than the RDCSRS, the next deeper sample will be analyzed. If this sample also contains

pentachlorophenol at a concentration greater than the RDCSRS, the deepest contingent sample will be analyzed.

2. The borings north and west of MPSB0049 will be completed to a depth of 10 feet. Samples will be collected for analysis from the 0.0' – 0.5', 2.0' – 2.5' and 5.5' – 6.0' intervals, with contingent samples collected from the 7.5' – 8.0' and 9.5' – 10.0' intervals. The three shallower samples will be analyzed for pentachlorophenol. If the sample from the 5.5' – 6.0' interval does not contain pentachlorophenol at a concentration greater than the RDCSRS, the contingent samples will not be analyzed. If the sample from the 5.5' – 6.0' interval does contain pentachlorophenol at a concentration greater tha the RDCSRS, the contingent samples will be analyzed consecutively until either pentachlorophenol is not found at a concentration greater than the RDCSRS or the final contingent sample is analyzed.

3. Borings will also be installed in the locations of MPSB0067 and MPSB0068. These borings will be installed to a depth of 20 feet, and samples will be obtained from the 15.5' – 16.0' interval in MPSB0067 and the 14.5' - 15.0' interval in MPSB0068. Contingent samples will be obtained from each boring in the 17.5' – 18.0' and 19.5' – 20' intervals.

   The results of these samples will be evaluated to determine what contingent samples in surrounding borings require analysis. For example, if the sample in the 14.5' – 15.0' interval in MPSB0068 contains pentachlorophenol at a level greater than the RDCSRS, then contingent sample from the 17.5' – 18.0' interval in MPSB0068 would be analyzed, as would the contingent samples from the 14.5' – 15.0' interval in the borings located northwest and southwest of MPSB0068.

4. The boring located between MPSB0049 and MPSB0056, and the three borings installed southwest and east of MPSB0067 and MPSB0068, will be installed to a depth of 20 feet.

   a) Samples will be collected from the 0.0' – 0.5', 2.0' – 2.5', 5.5' – 6.0' and 12.0' – 12.5' interval in the boring installed between MPSB0049 and MPSB0056 and analyzed for pentachlorophenol. These intervals have been selected to correspond to the intervals in which pentachlorophenol was found at levels greater than the RDCSRS in MPSB0049, MPSB0056 and MPSB0068. The 5.5' – 6.0' interval will be used to delineate the pentachlorophenol found in MPSB0068 in the 4.5' – 5.0' interval.

   b) Contingent samples will be collected from the 14.5' -15.0', 16.5' – 17.0' and 18.5' – 19.0' intervals. These samples will only be analyzed if needed to vertically delineate the pentachlorophenol in this boring, or if a sample deeper than 12.0' – 12.5' in MPS0068 contains pentachlorophenol at a concentration greater than the RDCSRS.

c) The boring immediately southwest of MPSB0067 will be completed to 20 feet. A sample will be obtained from the 13.5' – 14.0' interval and analyzed for pentachlorophenol. Contingent samples will be collected from the 15.5' – 16.0' and 17.5' – 18.0' and 19.5' – 20.0' intervals. These samples will only be analyzed if needed to vertically delineate the pentachlorophenol in this boring, or if a sample deeper than 13.5' - 14.0' in MPS0067 contains pentachlorophenol at a concentration greater than the RDCSRS.

d) The two borings northeast and southeast of MPSB0068 will also be installed to a depth of 20 feet. Samples will be collected from the 4.5' – 5.0' and 12.0' – 12.5' intervals and analyzed for pentachlorophenol. Contingent samples will be obtained from the 14.5' -15.0', 16.5' – 17.0' and 18.5' – 19.0' intervals. These samples will only be analyzed if needed to vertically delineate the pentachlorophenol in this boring, or if a sample deeper than 12.0' – 12.5' in MPS0068 contains pentachlorophenol at a concentration greater than the RDCSRS.

4.7 FORMER GAS STATION

The objective of the supplemental investigation of the former Gas Station is to define the horizontal extent of the residual petroleum contamination north of MPSB0064. The results of the initial phase of investigation of the residual petroleum contamination determined that it was defined by elevated PID readings, elevated TPH concentrations and, in some cases, naphthalene and/or benzene at concentrations greater than the RDCSRS. It was also determined that arsenic and lead are not found at levels greater than their RDCSRS in the residual petroleum contamination. However, XRF analysis of soil in the unsaturated zone will be conducted as part of this protocol.

4.7.1 Soil Boring Location

One soil boring will be installed north of MPSB0064 on the northern side of Berlin Road.

4.7.2 Sample Screening, Collection and Analysis Protocol

The sample screening collection and analysis protocol discussed for former Tank Farm A and the Seep Area will be used for this boring.

The boring will be advanced to the top of the water table. The bottom six inches of each two-foot interval in the unsaturated core will be analyzed with an XRF and field screened with a PID. If arsenic and lead are not found at levels above the RDCSRS, no elevated PID readings are observed and there is no visual indication of contamination (sheen or staining), the first sample collected will be from the top six inches above the water table.

If XRF results are greater than the RDCSRS, elevated PID readings are observed, or there is visual evidence of contamination, samples will be collected from the interval in which the evidence of contamination is present. Samples collected because arsenic or lead are found with the XRF at a level greater than the RDCSRS will be analyzed for TAL Metals. Samples collected because of elevated PID readings or visual evidence of residual petroleum contamination will be analyzed for TPH, TCL VOCs and TCL SVOCs.

The boring will be extended at least five feet (one Geoprobe core length) into the water table. The core will be screened with a PID in one-foot increments. The sample with the highest PID reading will be collected and analyzed for TPH, TCL VOCs, and TCL SVOCs. If elevated PID readings or other evidence of contamination are not observed in the bottom of the core, that sample will be collected for analysis for TPH, TCL VOCs, and TCL SVOCs.

If elevated PID readings or visual evidence of contamination is found in the one foot interval at the bottom of the five foot core, another core will be obtained. The field screening and observation protocol described for the initial five foot core will be conducted on the second core. This process will continue until there is no evidence of residual petroleum contamination in the bottom one foot interval of the deepest core.

If evidence of residual petroleum contamination is found in the borings, one additional step-out boring will be installed approximately 25 feet east of the boring installed across Berlin Road so that the eastern extent of the residual petroleum contamination is delineated. Delineation of the residual petroleum contamination to the north will be accomplished with the supplemental investigation in former Tank Farm A. The same sample screening and collection protocol discussed for the original borings will be used.

4.8 EASTERN OFF-PROPERTY AREA

The objective of the supplemental investigation of the Eastern Off-Property Area is to determine whether the residual petroleum contamination found in MPSB0077 and MPSB0078, located south of the former Gas Station, extends south to the residential properties along U.S. Avenue. This investigation will also provide data to assess the eatern extent of the residual petroleum contamination in the Seep Area. The results of the initial phase of investigation of the residual petroleum contamination determined that it was defined by elevated PID readings, elevated TPH concentrations and, in some cases, naphthalene and/or benzene at concentrations greater than the RDCSRS. It was also determined that arsenic and lead are not found at levels greater than their RDCSRS in the residual petroleum contamination. However, XRF analysis of soil in the unsaturated zone will be conducted as part of this protocol.

4.8.1 Soil Boring Locations

As shown on Figure 42, two additional soil borings are proposed for the Eastern Off-Property Area. One will be installed on the residential property immediately south of the former Gas Station and the other will be installed across U.S. Avenue from MPSB0026.

4.8.2 Sample Screening, Collection and Analysis Protocol

The same protocol used for Tank Farm A and the Seep Area will be used in the Eastern Off-Property Area.

The borings will be advanced to the top of the water table. The bottom six inches of each two-foot interval in the unsaturated core will be analyzed with an XRF and field screened with a PID. If arsenic and lead are not found at levels above the RDCSRS, no elevated PID readings are observed and there is no visual indication of contamination (sheen or staining), the first sample collected will be from the top six inches above the water table.

If XRF results are greater than the RDCSRS, elevated PID readings are observed, or there is visual evidence of contamination, samples will be collected from the interval in which the evidence of contamination is present. Samples collected because arsenic or lead are found with the XRF at a level greater than the RDCSRS will be analyzed for TAL Metals. Samples collected because of elevated PID readings or visual evidence of residual petroleum contamination will be analyzed for TPH, TCL VOCs, and TCL SVOCs.

The boring will be extended at least five feet (one Geoprobe core length) into the water table. The core will be screened with a PID in one-foot increments. The sample with the highest PID reading will be collected and analyzed for TPH, TCL VOCs and TCL SVOCs. If elevated PID readings or other evidence of contamination are not observed in the bottom of the core, that sample will be collected for analysis for TPH, TCL VOCs, and TCL SVOCs.

If elevated PID readings or visual evidence of contamination is found in the one foot interval at the bottom of the five foot core, another core will be obtained. The field screening and observation protocol described for the initial five foot core will be conducted on the second core. This process will continue until there is no evidence of residual petroleum contamination in the bottom one foot interval of the deepest core.

If evidence of residual petroleum contamination is found in the borings, an additional step-out boring will be installed at the eastern perimeter of the residential properties. The same sample screening and collection protocol discussed for the original borings will be used.

4.9 SILVER LAKE

4.9.1 Surface Water Sample Collection

The objective of the additional surface water collection and analysis is to determine whether the PAHs found in unfiltered samples during the most recent sampling event were associated with particle entrainment.

Filtered and unfiltered samples will be obtained from the previous locations of SLDW0003, SLDW0004, and SLDW0007. As was the case with the October 2009 surface water sampling, the surface water samples will be collected from six inches above the sediment. The filtered sample will be field-filtered using a 0.45 micron filter.

The filtered and unfiltered samples will be analyzed for TCL SVOCs.

SECTION 5.0
GEOPHYSICAL ANOMALY INVESTIGATION

5.1 SCOPE OF WORK

A geophysical survey was conducted in 2003/2004 in order to identify subsurface structures and utilities. The geophysical survey used Ground Penetrating Radar (GPR), Electromagnetic (EM), Magnetic (MAG) and Radio Frequency (RF) delineating techniques. GPR had been utilized in the past at select portions of the FMP, but the results were inconclusive. Therefore, multiple geophysical techniques were used concurrently to achieve the best results. The geophysical investigation was limited to the accessible exterior sections of the site and did not include any interior invasive or non-invasive techniques for structure investigation. Geo-Graf Geotechnical Engineering (Geo-Graf) was subcontracted to perform the survey. A brief description of the capabilities of each of the geophysical delineating techniques is provided in the following paragraphs to provide insight into the findings of the geophysical anomaly investigation.

Ground Penetrating Radar (GPR) – GPR data can be collected and used to delineate underground metallic and nonmetallic tanks, drums and utilities. The data can also be interpreted to delineate utility leaks, sinkholes and voids, geologic features such as near-surface consolidated rock, and contamination plumes. Other applications include the delineation of buried artifacts and historical structures, as well as use in the structural engineering fields (concrete floor/wall analysis, post-tensioned cable locating).

Electromagnetic Induction (EM) – EM techniques are used to delineate the location of subsurface utilities as well as the location and boundaries of large buried metallic objects including tanks, drum piles and foundations, among other things. EM is also capable of defining areas that contain conductive subsoil.

Magnetic Field (MAG) – MAG techniques are used to detect buried valves and manhole covers, individual drums or drum piles and to assist in the detection of utilities, tanks and other anomalous features.

Radio Frequency (RF) – RF techniques are capable of electrically tracing metallic pipes and cables. The instruments operate in either conductive (direct pipe contact) or inductive (inducing current onto pipe when a direct pipe contact is inaccessible) modes. RF techniques are used to locate and field mark underground metallic utilities.

Fifteen potential targets that warranted further consideration were identified during the 2003/2004 geophysical survey. These targets are presented in the following table and also on Figure 43 (Geophysical Investigation Findings – Areas Meriting Additional Investigation).

Geophysical Targets Meriting Additional Investigation

Target ID	FMP Study Area	Description
T-11	Seep Area	Possible buried structural feature (10' X 15') near entrance to 1 Foster Avenue
T-16, T-17	Former Tank Farm A	T-16 is a possible large buried structure (17' X 50') with possible buried metallic lid (T-17) located in 3 Foster Avenue parking lot
T-21, 22, 24	Former Resin Plant and Materials Storage Area	Possible buried structures or foundation remnants located along U.S. Avenue
T-31	Seep Area	Possible tank (8' X 11') near 5 Foster Avenue
T-35	Seep Area	Possible structure or tank near 5 Foster Avenue
T-48	Former Main Plant Area	Possible concrete or brick tank (10' X 20') located in 2 Foster Avenue parking lot
T-54	Former Main Plant Area	Possible tank (8' X 10') located south of Silver Lake at 2/4 Foster Avenue
T-56	Former Tank Farm A - Former Gasoline Service Station	Possible buried concrete pad (25' X 45') located within U.S. Avenue adjacent to the former gasoline service station
T-57, 58	Former Tank Farm A - Former Gasoline Service Station	Possible foundation or former roadbed (30' X 100') located along U.S. Avenue
T-59, 60	Former Main Plant Area	Possible former production wells located in 6 East Clementon Road parking lot

The geophysical target investigation was designed with a multi-phase approach. The first phase was structured to evaluate the findings of the geophysical survey. The goal was simply to identify the anomaly. The target was uncovered, examined and evaluated, then backfilled with the excavated soil and the area restored. The final task of this initial phase was to make a determination as to the appropriate additional actions required, if any, based upon the field observations.

The excavation soils were screened with a photoionization detector (PID) for volatile organic compounds (VOCs) and a portable XRF unit for arsenic and lead. The NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRS) criteria for arsenic (19 mg/kg) and lead (400 mg/kg) were used as a basis of comparison.

During these excavation/investigative activities it was agreed upon with EPA that there would be no removal activities performed unless an immediate environmental response was required. The presence of any subsurface structures such as foundations, tanks or other artifacts would simply be noted and evaluated as to the next step (sampling, removal, no action required) to be taken at a future date.

5.2 FINDINGS

The excavation/investigative activities took place during April/May 2010 with EPA's oversight contractor as well as the presence of EPA and NJDEP representatives who were on-site at various times during the course of the excavation activities. Prior to the start of the excavation activities Sherwin-Williams arranged for Geo-Graf (the

geophysical survey subcontractor) to re-locate and confirm the targets of interest and perform additional utility mark-outs above and beyond the One-Call Underground Utility mark-outs required by law. These targets are presented in the following table and also on Figure 43 (Geophysical Investigation Findings – Areas Meriting Additional Investigation).

Geophysical Targets Meriting Additional Investigation

Target ID	FMP Study Area	Description
T-11	Seep Area	Possible buried structural feature (10' X 15') near entrance to 1 Foster Avenue
T-16, T-17	Former Tank Farm A	T-16 is a possible large buried structure (17' X 50') with possible buried metallic lid (T-17) located in 3 Foster Avenue parking lot
T-21, 22, 23*,24	Former Resin Plant and Materials Storage Area	Possible buried structures or foundation remnants located along U.S. Avenue
T-31	Seep Area	Possible tank (8' X 11') near 5 Foster Avenue
T-35	Seep Area	Possible structure or tank near 5 Foster Avenue
T-48	Former Main Plant Area	Possible concrete or brick tank (10' X 20') located in 2 Foster Avenue parking lot
T-54	Former Main Plant Area	Possible tank (8' X 10') located south of Silver Lake at 2/4 Foster Avenue
T-56	Former Tank Farm A - Former Gasoline Service Station	Possible buried concrete pad (25' X 45') located within U.S. Avenue adjacent to the former gasoline service station
T-57, 58	Former Tank Farm A - Former Gasoline Service Station	Possible foundation or former roadbed (30' X 100') located along U.S. Avenue
T-59, 60	Former Main Plant Area	Possible former production wells located in 6 East Clementon Road parking lot

* Target T-23 added at EPA request

As part of the investigative activities, the asphalt and soil above the target was removed so that the target could be observed. The excavation outlines of the targets and their relevant observations excerpted from the daily field notes are presented on Figure 44. The excavation locations are overlain on the Subsurface Anomaly Map (Figure 45) prepared during the 2003/2004 geophysical survey and also on the Historic Site Plan – Undated Factory Plat (Figure 46) in order to provide a reference with the former plant and other historical features. A photo log documenting the observations noted during the various anomaly excavations is included in Appendix D. A discussion of each of the targets investigated during this program follows.

5.2.1 Target T-11

Target T-11 had been identified as a possible buried structural feature near the entrance to 1 Foster Avenue (former Bldg. 36). This feature is located in the vicinity of the Seep Area.

Based on Geo-Graf's geophysical interpretation, T-11 was identified as a 10' x 15' GPR-detected target, possibly a nonmetallic buried structural feature with an indefinable exact shape and size that may also be utility related.

Two trenches were excavated, one inside the anomaly and the other on the outer boundary. The excavation inside the anomaly was extended to 6 feet bgs, at which depth groundwater with a faint sheen was observed to enter the excavation. PID readings ranged from 0 ppm (at <2', 5' and 6' bgs) to 338 ppm (3' bgs). XRF screening for arsenic (8 mg/kg maximum) and lead (33 mg/kg maximum) were below the RDCSRS.

The outer trench was excavated to a depth of 2.5 feet bgs where free-phase product was observed flowing into the excavation in the vicinity of a buried foundation wall that is likely a remnant of the former facility. Approximately 20 gallons of product/water mix were recovered and transferred to the existing free-product recovery (FPR) system. The flow abated and the excavation was backfilled.

It should be noted that this same foundation wall was also uncovered during previous site activities in 1996 when free-phase product was observed during the replacement of the adjacent catch basin and storm sewer. This removal action is detailed in the "*Draft Remedial Action Report – Police Station Area – The Paint Works Corporate Center Site – Gibbsboro, New Jersey*" dated April 1999.

5.2.2 Targets T-16 and T-17

Target T-16 was identified as a possible large buried structure (17' X 50') and T-17 as a possible buried metallic lid potentially associated with T-16. Both features are located in the existing 3 Foster Avenue parking lot in the vicinity of former Tank Farm A.

Based on Geo-Graf's geophysical interpretation, T-16 was identified as a GPR-detected target, a definable buried object, possibly a nonmetallic tank. Depth to the top of this feature is estimated to be 3' to 6' below grade. T-17 was identified as an EM and MAG-detected target; possibly a buried metallic riser or lid feature associated with T-16. Depth to top of this feature is estimated to be 2' to 4' below grade.

Target T-16 - As part of the investigative activities for this anomaly, a trench was dug approximately 10 feet deep in the center of the excavation in an attempt to locate any buried structures. The soils were screened with a PID and the readings ranged from 231 ppm at 1.5' bgs to 1,647 ppm at 8' bgs. No structure was found so the trench was extended to outside the anomaly footprint. There was a noticeable difference between the soils within the excavation versus the soils within the excavation attributed to backfill placement.

Target T-17 – A 10-inch diameter steel pipe was discovered approximately 1.5' bgs. There were no liquids, staining or discoloration noted inside the pipe. The pipe

appeared to continue outside the excavated area towards the adjacent building (3 Foster Avenue). The pipe end was plugged prior to closing the excavation to prevent any water or soils from entering the pipe.

5.2.3 Targets T-21, T-22 and T-24

Targets T-21 T-22 and T-24 were identified as possible buried structures or foundation remnants located alongside the Metal Storage Shed (former Bldg. 66) adjacent to United States Avenue. These features are associated with the Former Resin Plant and Material Storage Area.

Based on Geo-Graf's geophysical interpretation, T-21 was identified as a possible utility or duct-like feature, estimated 4' to 6' below grade; T-22 was identified as a possible utility-related feature or remnant, estimated 2' to 4' below grade; and T-24 was identified as a possible utility-related feature or remnant, estimated 4' to 6' below grade. These targets were all identified utilizing GPR.

There were a total of 7 excavations opened in the area contained within these targets. The PID readings were all zero (background) except for T-24 located adjacent to the Metal Barn where soil with a petroleum odor was observed and the maximum PID reading was 131 ppm.

Likewise, the XRF screening results were all below the RDCSRS, except for one location (T-22 on 4/21/10 at 3.5' – 4.0' bgs) where XRF screening detected arsenic at 22 mg/kg. There was miscellaneous debris and concrete encountered in the excavations. There were a few instances where either a black (10 ppm PID) or white (0 ppm PID) sticky material was observed, however it was only present in a few isolated places and was not pervasive throughout the excavations.

During the excavation for these anomalies EPA requested that we extend the excavation northward and investigate anomaly T-23. Based on Geo-Graf's geophysical interpretation, T-23 is an EM-detected target with no correlating GPR feature delineated. Upon additional excavation of this area, debris covering a concrete slab laced with rebar was noted. This was likely the cause of the EM response during the geophysical survey.

5.2.4 Target T-31

T-31 was identified as a possible underground storage tank (UST) located near the Police Station that historically had been presumed to be a gasoline tank associated with the former Maintenance Building (former Bldg. 50) operations. A 550-gallon gasoline UST was identified on an historic John Lucas and Company Plant Map dated November 17, 1947 and also on an historic Factory Insurance Association Plant Map dated April 16, 1964. Both figures have been presented in previous reports submitted during the course of this project. This feature is located in the vicinity of the Seep Area.

Based on Geo-Graf's geophysical interpretation, T-31was identified as a possible 8' x 11' UST detected by EM and MAG. Depth to top of the target based on GPR data estimates is 2' to 4' below grade.

The tank is located beneath and within the root system of a medium-sized mature tree in addition to being bracketed by gas, electric, water, sewer and communication utilities. Due to interference from the tree and adjoining utilities in the immediate vicinity of the excavation, a small test pit approximately 3.5' by 3.0' was advanced in an attempt to determine the nature of the anomaly. An underground storage tank was discovered approximately 3' bgs.

There was no evidence of stained or impacted soils and there were no thru-thickness holes or corrosion noted in the portion of the tank that was uncovered. PID readings ranged from 0 ppm (<2' bgs) to 350 ppm (3.0' bgs) and XRF screening for arsenic and lead in the soils above the tank were below the RDCSRS.

An attempt was made to access the tank through one of the top fittings, however this attempt was unsuccessful and therefore it was not possible to determine the presence or volume of any residual liquids that may have still been inside the tank.

5.2.5 Target T-35

Target T-35 was identified as a possible structure or tank located off the southeastern corner of 1 Foster Avenue (former Bldg. 36). This feature is located in the vicinity of the Seep Area. Based on Geo-Graf's geophysical interpretation, T-35 was identified as a GPR-detected, definable possible structure or tank, possibly associated with an old septic system. Depth to top of feature based on GPR data estimates is 2' to 4' below grade.

A concrete slab/pad (12' X 18') was uncovered at a depth of 2.5' bgs. A concrete foundation that is likely a remnant of the razed half of former Bldg. 36 (1 Foster Avenue) was also uncovered adjacent to the slab. There were also 2 steel pipes (2" in diameter) uncovered that ran between the foundation and the concrete slab. The pipes were intact with no evidence of leaking or staining associated with them. The piping for the existing product recovery system is routed on the other side of the slab.

The PID readings were all zero (background) except for some black stained material noted below the slab with a petroleum odor and a PID reading of 684 ppm and XRF screening results for arsenic (29 mg/kg) and lead (640 mg/kg), both exceeding the RDCSRS. There was also some white material noted in the debris that did not exhibit any PID or unusually high XRF readings (arsenic = 20 mg/kg; lead = 335 mg/kg).

5.2.6 Target T-48

Target T-48 was identified as possible concrete or brick tank (10’ X 20’) located in the 2 and 10 Foster Avenue parking lot. This feature is located in the vicinity of the Former Main Plant Area. Based on Geo-Graf’s geophysical interpretation, T-48 was identified as a GPR-detected, definable possible structure, possibly a concrete or brick square tank. Estimated depth to top of feature is 3' to 5' below grade.

Four separate test pits were excavated in and around this anomaly to a depth of 6.5’. There were no structures detected; however there was ash and cinders noted in this area ranging from 2’ to 4’ in depth. Generally the PID readings were all zero (background) except for one location (T-48 EX2) where a maximum PID reading of 88 ppm at 1.5’ depth was noted. Likewise, the XRF screening results were all below the RDCSRS. Less than a sandwich bag-sized amount of green material was found in the excavations; the XRF screening results were all below the RDCSRS. Native soil was encountered at approximately 3.5’ bgs.

5.2.7 Target T-54

Target T-54 was identified as a possible UST located south of Silver Lake adjacent to 4 Foster Avenue. This feature is located in the vicinity of the Former Main Plant Area.

Based on Geo-Graf’s geophysical interpretation, T-54 was identified as a possible UST (8' x 10'). Characteristic UST-like GPR data signatures were detected over this target area. Estimated depth to the top of the feature is 2' to 3' below grade.

Three separate excavations were performed in and around this structure in an attempt to identify it and the soil conditions around the structure. During the excavation activities, a vertically-oriented, short and squat, round object (6’ in diameter and 2.5’ in height) was uncovered 1.5’ below grade. There was a sheet metal/plywood lid covering the opening, with a compartmentalized, baffle-type structure inside. A 2-inch diameter pipe entered/exited the structure at the bottom (4’ bgs). Due to the proximity of this feature to an existing gazebo and the walkway around Silver Lake, the maximum excavation depth achieved was 4’ bgs. The object is not a UST, though its remnants may best be described as possibly a vertical tank or structure that was cut below the ground.

There was water contained within the structure and approximately 90 gallons were pumped into 2 drums in an attempt to inspect the interior, however the water recharged and the inspection could not be accomplished. There was no sheen or odors noted in the water and the liquids were transported off-site for disposal with the other investigation-derived wastes generated during the course of the project.

The PID readings were all zero (background) and the XRF screening of the soils surrounding the structure were below the RDCSRS for arsenic and lead. However,

there was some yellow material (As = 141 mg/kg and Pb = 11,558 mg/kg) and wood (As = 25 mg/kg and Pb = 491mg/kg) on the cover that exceeded the RDCSRS.

There was also some green-stained material found intermittently outside the structure in the excavation and around the pipe that exhibited XRF readings above the RDCSRS screening levels (As = 313 mg/kg and Pb = 33,663 mg/kg).

5.2.8 Target T-56

Target T-56 was identified as a possible buried concrete pad (25' X 45') located in United States Avenue adjacent to 2 Foster Avenue (former Bldg. 56) and the Former Gasoline Service Station. This feature is located near the intersection of United States Avenue and Berlin Road. Based on Geo-Graf's geophysical interpretation, T-56 was identified as an EM & GPR detected target with the GPR profiles indicative of shallow buried reinforced concrete pad (25' X 45').

Due to the numerous utilities identified in this area and the fact that this structure is identified as being located in the United States Avenue/Berlin Road intersection, there was no intrusive investigative work performed with regards to this feature. It is likely that this feature is associated with the roadway and subsurface utilities contained within the right-of-way.

If additional information or data is discovered that warrants intrusive activities in this area, then future investigative work in this area may be considered. Otherwise, Sherwin-Williams proposes no action be undertaken for this target at this time.

5.2.9 Targets T-57 and T-58

Targets T-57 and T-58 were identified as a possible foundation or former roadbed located in the roadway of United States Avenue. These features are located adjacent to Tank Farm A.

Based on Geo-Graf's geophysical interpretation, T-57 was identified as a 30' x 100' GPR target, possible a former roadbed, foundation, or other similar feature. Depth to the top of the feature is ~4' to 6' below grade. T-58 was identified as a 20' x 100' GPR target also a possible former roadbed, foundation or other similar feature. Depth to the top of the feature is ~4' to 6' below grade.

Due to the numerous utilities identified in this area and the fact that this structure is identified as being located in the United States Avenue roadway, there was no intrusive investigative work performed with regards to this feature. It is likely that this feature is associated with the roadway and subsurface utilities contained within the right-of-way.

If additional information or data is discovered that warrants intrusive activities in this area, then future investigative work in this area may be considered Otherwise, Sherwin-Williams proposes no action be undertaken for this target at this time.

5.2.10 Targets T-59 and T-60

Targets T-59 and T-60 were identified as possible locations for the former production wells located in the parking lot adjacent to 6 East Clementon Road (former Bldg. 57/62). These features are located in the vicinity of the Former Main Plant Area. Based on Geo-Graf's geophysical interpretation, T-59 and T-60 were identified as MAG detected targets that could be associated with former well locations within this parking area at the southeast corner of Foster Ave and East Clementon Road.

The excavation for T-59 extended only to a depth of 2.5' bgs where an uneven concrete surface was uncovered. The excavation was expanded to dimensions of 7' X 6', however the limits of the concrete were not found and the excavation was abandoned. The PID readings were all zero (background), though XRF screening was not performed for the soils covering the concrete. Water with a faint sheen was noted to enter the excavation and approximately 50 gallons were pumped into a drum to inspect the concrete pad. The liquids were transported off-site for disposal with the other investigation-derived wastes generated during the course of the project.

The excavation for T-60 extended to a depth of 6' bgs, however there were no structures detected. An 8 to 10-inch diameter pipe that is likely associated with either the fire loop or storm sewer system ran through the excavation at a depth ranging from 2' to 3' bgs.

An isolated (sandwich bag –sized) piece of red material resembling brick was found at 1.5' bgs with a PID reading of 417 ppm and XRF readings for arsenic (113 mg/kg) and lead (8,529 mg/kg). The PID results for the rest of the soils in the excavation ranged from 307 ppm to 390 ppm, while the XRF screening results were all below the RDCSRS.

Water also entered this excavation; however, there was no sheen or odors noted. In order to ensure proper compaction and restoration of the parking lot, the wet soils were placed in a sludge box container and the excavation was backfilled with stone and dense grade aggregate in preparation for paving. The soils were transported off-site for disposal with the other investigation-derived wastes generated during the course of the project.

5.3 RECOMMENDATIONS

During the geophysical investigation a total of 16 targets were investigated consisting of the 15 initial targets and 1 additional target (T-23) requested by EPA during the field activities.

There were 3 targets (T-56, T-57 and T-58) that due to their nature and location in the roadway (United States Avenue) were not investigated at this time. These targets are likely associated with the subsurface utilities and road construction. If additional information or data is discovered that warrants intrusive activities in these areas, then future investigative work may be considered. Otherwise, Sherwin-Williams proposes no action be undertaken for these targets at this time.

There are 2 targets (T-31 and T-54) for which Sherwin-Williams proposes an Interim Remedial Measure (IRM) consisting of closure/removal or abandonment in-place of the discovered tank. The tank discovered at 5 Foster Avenue (T-31) and the unknown structure (T-54) discovered near Silver Lake and 4 Foster Avenue would warrant such consideration.

There is 1 target (T-11) for which Sherwin-Williams proposes an IRM consisting of a modification to the existing product recovery system by installing a product recovery well in this area.

There are 10 targets (T-16, T-17, T-21, T-22, T-23, T-24, T-35, T-48, T-59, and T-60) for which there were no remarkable or unusual observations or the presence of structures. Based on the site observations, no further investigation is proposed at this time.

The recommendations for the geophysical anomalies are broken down into two categories; Interim Remedial Measure (IRM) Proposed and No Further Action Proposed. A discussion of each of the individual targets within each category follows.

5.3.1 Interim Remedial Measure Proposed

Target T-11 - Free-phase product was noted flowing into the excavation; however this area is upgradient of the interceptor trench installed in the riprap area leading to Hilliard Creek.

It is anticipated that this material will be captured and its migration prevented by the interceptor trench, however Sherwin-Williams proposes an IRM consisting of a modification to the existing product recovery system by installing a product recovery well in this area.

Target T-31 - Sherwin-Williams proposes implementation of an Interim Remedial Measure (IRM) to address the closure of this tank.

Based upon previous guidance received from NJDEP, Sherwin-Williams will register the UST and coordinate access with the property owner (Brandywine) so that the tank can either be removed or abandoned in-place. To the extent that it is practical, the closure and investigation of this UST will be consistent with the NJDEP Technical Requirements for Site Remediation (NJAC 7:26E et seq.). For example, if there is evidence of a loss of integrity in the tank, an investigation of the soil beneath the tank will be conducted.

However, since the UST is located in an area already undergoing investigation (i.e., NPL listed site), any sampling or reporting requirements will be included within the scope of the overall site investigation. A separate investigation consistent with the NJDEP Technical Requirements for Site Remediation will not necessarily be performed solely for the tank.

Target T-54 - Based upon a review of historical site maps, a determination as to the nature of this structure has not been made. Sherwin-Williams proposes the implementation of an IRM entailing closure/removal or abandonment in-place of this structure, as applicable.

5.3.2 No Further Action Proposed

Targets T-16 and T-17 - No structure was found within the footprint of the anomaly, however there was a noticeable change in soil condition from within the anomaly to outside the anomaly. It is likely that the geophysical survey detected this change in soils, attributed to the removal of a structure associated with the former plant operations and backfilling with dissimilar soils. The pipe contained within the excavation appeared clean and the pipe was plugged to prevent any water or soils from entering the pipe. Based on an evaluation of the site observations no further investigation is warranted in this area at this time.

Targets T-21, T-22, T-23 and T-24 – There were no remarkable or unusual observations or the presence of structures noted during the excavation activities. The excavations were generally found to contain concrete debris and other materials. There were a few instances where either a black or white sticky material was observed, however it was only present in a few places and was not pervasive throughout the excavations. This material did not exhibit any unusually high PID or XRF readings. Based on an evaluation of site observations no further investigation is warranted at this time.

Also, in response to EPA's request regarding a possible buried railroad car containing toluene depicted on an undated historical figure of the FMP that prominently features a tank schedule of the various tanks, capacities and their contents (hereinafter referenced as the "Historic Tank Schedule"); the excavations for these anomalies were overlaid on a figure (Figure 47) depicting their locations relative to the railroad siding and rail car shown on the "Historic Tank Schedule". Excavation T-22 investigated on April 22, 2010 is in close proximity to this feature. This information was also transmitted to EPA in a letter report dated August 27, 2010.

Target T-35 - There were no remarkable or unusual observations or the presence of structures noted during the excavation activities. The excavation was found to contain a concrete slab and a concrete foundation that is likely a remnant of the razed half of former Bldg. 36 (1 Foster Avenue). Based on an evaluation of site observations no further investigation is warranted at this time.

Target T-48 - There were no remarkable or unusual observations or the presence of structures noted during the excavation activities. It is likely that the GPR detected differences in the subsoil layers or perhaps, as in the case of T-16 and T-17, an existing structure may have been removed and the GPR detected the former footprint. Based on an evaluation of site observations no further investigation is warranted at this time.

Target T-56 - Due to the numerous utilities identified in this area and the fact that this structure is identified as being located in the United States Avenue/Berlin Road intersection, there was no intrusive investigative work performed with regards to this feature. It is likely that this feature is associated with the roadway and subsurface utilities contained within the right-of-way.

If additional information or data is discovered that warrants intrusive activities in this area, then future investigative work in this area may be considered. Otherwise, Sherwin-Williams proposes no action be undertaken for this target at this time.

Targets T-57 and T-58 - Due to the numerous utilities identified in this area and the fact that this structure is identified as being located in the United States Avenue roadway, there was no intrusive investigative work performed with regards to this feature. It is likely that this feature is associated with the roadway and subsurface utilities contained within the right-of-way.

If additional information or data is discovered that warrants intrusive activities in this area, then future investigative work in this area may be considered. Otherwise, Sherwin-Williams proposes no action be undertaken for this target at this time.

Targets T-59 and T-60 - There were no remarkable or unusual observations or the presence of structures noted during the excavation activities. Based on an evaluation of site observations no further investigation is warranted at this time.

Even though the former production wells were not located, Sherwin-Williams installed one shallow and four deep borings in the vicinity of the former production wells during the RI field activities to evaluate the soil and groundwater impacts, if any, in this area.

SECTION 6.0
SUMMARY AND CONCLUSIONS

The results of the most recent phase of investigation of the FMP area of the Sherwin-Williams Hilliard Creek Site have:

- Identified the constituents that will be retained for further analysis in any future investigations of the individual study areas;

- Supplemented the understanding of the extent and composition of the residual petroleum contamination located in the former Resin Plant, Tank Farm A, Gas Station, Seep Area and Eastern Off-Property Area;

- Provided vertical delineation of the vast majority of constituents in soil;

- Identified those locations where additional horizontal or vertical delineation of constituents in soil is required;

- Documented that no site-related constituents of concern are present in soil north (Northern Off-Property Area), west (Western Off-Property Area), or south (Northern Bridgewood Lake Tract, Southern Off-Property Area) of the FMP;

- Characterized the nature and extent of constituents in Silver Lake sediment and surface water;

- Provided an updated picture and additional understanding of current shallow and deep groundwater conditions; and

- Identified the geophysical targets at which IRMs will be conducted.

Additional investigation of soil, surface water and groundwater is needed to complete the Remedial Investigation of the FMP portion of the Hilliard Creek Site. Sherwin-Williams has in this data evaluation report provided a recommended scope of work for a supplemental investigation of soil and surface water, as well as a proposal to implement IRMs at several geophysical targets. The results of the 2009 and 2010 groundwater sampling are currently being reviewed and evaluated, and a separate work plan for additional groundwater investigation will be submitted to the EPA by June 1, 2011.